STEEL

The

Metalworking Weekly

DECEMBER 5, 1960

A PENTON PUBLICATION

FOREIGN ROUNDUP NO. 1

Japan: Good Market to Get Better

Titanium Diboride—New Space Age Material Vies for Mundane Jobs Too

Rotary Diamond Dressing of Grinding Wheels Upgrades Part Quality

Near Peak Scrap Exports Give Lift To Sagging Domestic Market

CONTENTS—TURN PAGE

MATERIALS EFFICIENCY

Get More For Less

Negotiating skill is one of the keys to an individual's success and to the profitability of his company. "It is perhaps the most advanced skill in industrial buying," says Russell T. Stark, director of purchases, Burroughs Corp. Mr. Stark and other authorities give tips on how to develop that skill, when to use it, how to prepare for and conduct a negotiating session, what tools and techniques to use, what pitfalls to avoid, and how to obtain a mutually satisfactory contract—Page 69.

FOR EASE OF FINISHING HYDRAULIC CYLINDERS SPECIFY

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This Week in STEEL

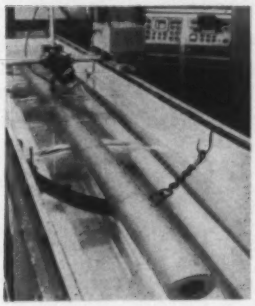
The Metalworking Weekly

December 5, 1960 Vol. 147 No. 23

Japan: Good Market to Get Better

Japanese firms are giving many U. S. companies stiff competition. But our Far Eastern ally is still a $1 billion a year market for U. S. goods—second only to Canada as this nation's best foreign customer. An additional $1 billion worth of goods will be flowing into Japan by the end of the decade, predicts Nelson A. Stitt, director, U. S.-Japan Trade Council, Washington. Sales won't be automatic, but Mr. Stitt says demand will increase most in commodity groups in which the U. S. export position will probably be strong. PAGE 59

Ultrasonic Setup Tests Heavy Sections



Ultrasonic immersion testing is said to permit faster, less expensive inspection of forging squares, round bars, and large, seamless tubing (photo) at the Steel & Tube Div., Timken Roller Bearing Co. The testing tank, designed by Timken engineers, is 30 ft long. It will take sections as large as 12 in. square or 11 in. in diameter. The immersion method doesn't require special preparation of the test surface; previously, when the contact method was used, a thin film of glycerine or oil had to be applied as a coupling medium. PAGE 104

Wheel Dressing Technique Upgrades Part Quality

Before Ford Motor Co. switched to rotary diamond dressing of grinding wheels at its Northville, Mich., plant, a wheel was worn out by the time about 32,000 parts were produced. The present technique raised the average to more than 136,000 parts. Product quality is now maintained at consistently higher levels. PAGE 109

Space Age Material Solves Mundane Problems Too

Numerous possible uses have been suggested by National Carbon Co., a division of Union Carbide Corp., for its titanium diboride shapes, such as bearings for jet and rocket engines, milling media, cutting tools, and shear blades. For properties and other uses, see PAGE 108

Near-Peak Scrap Exports Bolster Market

Exports of iron and steel scrap are running at a near-record pace this year, providing a much needed lift for a sagging domestic market. It looks like the 1960 export total will reach 6.7 million net tons, only about 100,000 tons under the record set in 1957. PAGE 131

COMPLETE CONTENTS ▶

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The Gnu who Gnew it all

In far-off Africa, there once lived a gnu named Hugh. In most respects he was a good gnu —and there's no gnus like good gnus.

But one day Hugh went to Uncle Gnuton, the leader of the herd. "Say, unc," said Hugh, "we been eating out here on the veldt all these years. How about we try the jungle for a change? I hear they got mighty tasty tidbits in there."

"My boy," replied the wise old bull, "there are better ways to direct your spirit of adventure. There's danger in the jungle. Take my word for it, gnus are better off out here on the plains."

Hugh was not convinced. That evening he stole away to the jungle, and was soon gorging himself on tender shoots. "Hah," he thought, as he chomped greedily, "before they wise up I'll have the lion's share."

He was wrong. A few moments later he was the lion's share.

Whether your needs be tender shoots or steel, your safest, most reliable suppliers are right here at home. Remember, no one knows the needs of American steel buyers better than American steel makers. To serve you, and serve you well, is our primary concern—not just today and tomorrow—but year after year.

Isn't it reassuring to know the steel you buy is made by old and proven friends? It's steel of certified analysis, meeting appropriate specifications. You can rely on Bethlehem Steel for a wide range of standard and specialty products. And remember, our engineers are on call to help you solve your steel-working problems.

Isn't it time to place an order for your next steel requirement with Bethlehem?

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BETHLEHEM STEEL

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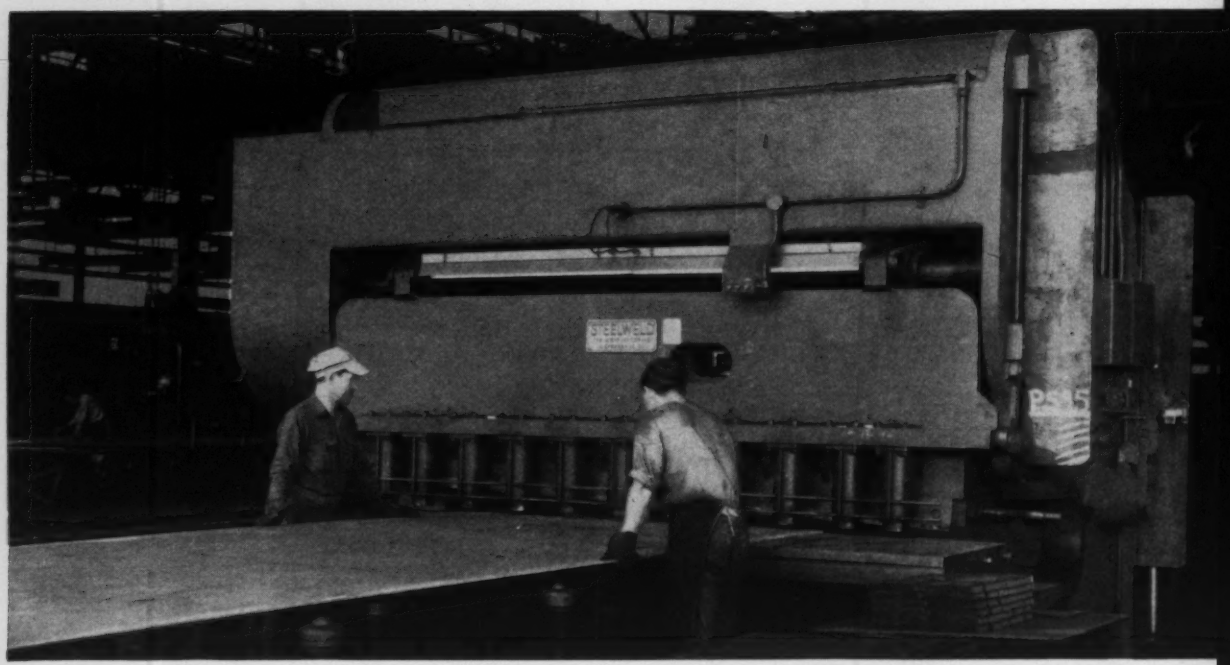
BETHLEHEM STEEL

Operators LIKE STEELWELD MACHINES

THE MAN who operates a machine day in and day out usually gets to know it pretty well. If he has worked on various make machines, he is in a position to compare. He knows the good as well as the weak points. He can tell you what machines make his job easiest, what produce the most, what require the least maintenance. We have great respect for the operators and listen to what they say.

What we have been hearing about Steelwelds has elated us greatly. Briefly it is this: The operators have high regard for Steelwelds. They like their ease of operation which leaves them fresher at the end of the day. They approve the various adjustments with which Steelwelds are equipped and the simplicity of making them. They applaud the fact that the machines will operate continuously for long periods without need of attention.

The combination of the above factors, namely: Ease of operation, high production, excellent performance, and low maintenance, is hard to beat and accounts for the ever increasing popularity of Steelweld Presses and Shears.



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This ruggedly built press is an operator's delight. It is provided with a reversing ram drive which permits backing the ram or upper die away from the work at any point in the stroke.

Since parts are produced in small quantities on this press, the dies and machine settings usually must be changed many times during a day. The reversing ram and other fine features make this work easy and fast for the operators.

This press is rated at ½" x 14'-0" mild steel but will bend plate to 18'-6" long that can clear the 18" deep throat.

No Other Shear Has So Many Important Features

Operators in hundreds of plants all over the country have acclaimed the ease of operation of Steelweld Shears. They like them because they have features that ease their work and make for accuracy. Steelweld is the **only** pivoted-blade shear on the market. No other shear has the wonderful MICRO-SET knife adjustment. Every Steelweld Shear is provided with fatigue-reducing electric foot switch control as standard equipment.

This shear is rated at 10' x 1".

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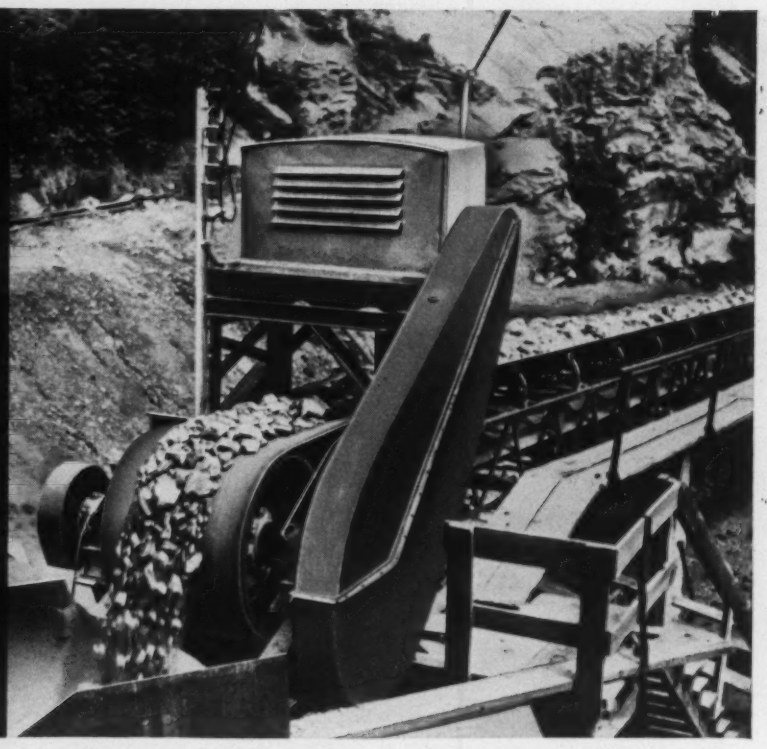

...the conveyor belting built for the belt-killers

This is it! New Industrial UNIFLO is the *first* woven-carcass rubber belting specifically designed to make history in hard-rock mining, quarrying, steel mills, pulp mills, foundries and the like.

New Industrial UNIFLO construction is available in a variety of compounds and gauges—including heat- and oil-resistant types. And extensive tests—underground and above-ground alike—have proved its superior capabilities under the toughest operating conditions.

To be specific, UNIFLO construction has . . .

. . . **proved** its unparalleled resistance to internal rupture caused by trapped material or pulley build-up

. . . **proved** its tear-resistance 3 times as great as comparable synthetic fabric-reinforced belts—10 times as great as comparable cotton-reinforced belts

. . . **proved** its excellent impact-resistance

. . . **proved** its unusually fine cover adhesion and cut-resistance

. . . **proved** its outstanding troughability and trainability

. . . **proved** its exceptional edgewear resistance

. . . **proved** its top-rank fastener-retention—handling wet or dry materials

But these are only the highlights of the great new Industrial UNIFLO Belting. For complete details, check with the G.T.M. – Goodyear Technical Man – through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

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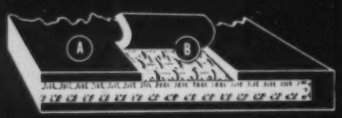

A Seamless, tough covers in a full range of compounds and thicknesses for superior protection against cuts, abrasion, heat and oil

B Single unit carcass of high-tensile, interwoven yarn bonded to the cover under high pressure to give you exceptional strength and fastener-holding qualities — good troughability and trainability

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Preparing for 1961

Our technical editors have been working long hours in laying plans for the Forum on Technical Progress, a section in our 1961 Yearbook. (It will carry a Jan. 2, 1961, dateline.) Several hundred authorities have been asked to submit their latest thinking in 15 important categories: Steelmaking, nonferrous metal production, casting, materials and metallurgy, heat treating, inspection and testing, drives and controls, machining, tooling and gaging, forming, cleaning and finishing, joining and assembly, handling and packaging, lubrication, service and maintenance.

A summary of highlights will be run at the head of each category, and each category will be subdivided for your reading convenience. For example, under Machining, you'll find a section on Numerical Control. Watch for your special interest. We believe you'll find it valuable.

An Explanation . . .

. . . of footnote No. 4 in the High Strength Steels section of our 1960 Metal Selector was called for by H. Johnson, manager of agency sales, A. C. Leslie & Co. Ltd., Montreal, Que. Said he: ". . . I read (*Heat treatment required to meet tensile properties shown*) to mean that these steels require heat treatment by the customer . . . These steels are heat treated at the mill and are sold on the basis of the steel having the yield and tensile mentioned; this is without further heat treating . . ."

You're right, Mr. Johnson. The notation was inserted to explain why different physical properties could be obtained with what are essentially the same compositions.

STEEL Takes the Stand

Machine Tool Editor Bob Huber appeared as a witness in Federal District Court in Washington to help Armco Steel Corp., Middletown, Ohio, establish its claim to the trademarks 17-4 PH and 17-7 PH. Bob testified that in STEEL, and in the editors' conversations with contacts in the steel, aircraft, missile, and other industries, those designations referred to Armco materials. In our editors' experience, Armco ownership of those labels for special stainless steels has never been contested (except, it seems, by the U. S. Patent Office).

A letter to Bob from John C. Griffin, associate counsel for Armco, reveals the outcome: ". . . we were completely successful in the . . . trial. Much of our success was due to your testimony; as a matter of fact, the judge referred specifically to it in his opinion . . ."

. . . that about 5000 different items are packed in tin cans? And did you know that more than 26 billion tin cans a year are filled by U. S. food packers? Those facts are among the reasons Pittsburgh Resident Editor Bill Wallace started examining tin cans while researching next week's article, "What's Ahead for Thin Tin Plate?"

His assignment sheet read: "This new product is aimed at holding or recapturing old markets and snaring new ones. At a time when tin plate sales are slipping, what effect is thin tin plate having on the market? Are customers taking to it readily? Does it require new machinery or techniques?"

In ferreting out the answers to those and other questions, Bill discovered that at least four companies are making and supplying thin tin plate in more than experimental volume. Interest is so high that some companies have indicated they are willing to jump into volume production on a continuing basis, even if they have to use makeshift equipment.

The lures: Lighter gages equal lower material and freight costs. Get the whole story next week.

Exposing Potential

"I was interested in your Oct. 3 article, '15 Ways Photography Pays Off,'" writes E. S. Purrington, executive vice president, Meteor Photographic, Detroit. "An article like this can do much to expose management to the potential photography holds in industry.

". . . in the second line of the first paragraph, the article states: '. . . and in most cases you don't have to hire a professional.' I am sure you meant that it isn't necessary to utilize the

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services of a photographic organization outside the corporate structure . . ."

Your interpretation is entirely correct.

The Inquiry Flow

C. William Verity Jr., director, organization planning and development, Armco Steel Corp., Middletown, Ohio, wrote to us about our Oct. 17 article, "Armco Builds Up Managers' Skills":

"I want to thank and congratulate you for the splendid article on (Armco's) Profession of Management program. You covered a tremendous amount of territory in a few words, and did it well. Already, we have received almost 50 inquiries from companies that first heard of the program from reading your article . . ."

You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—December, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

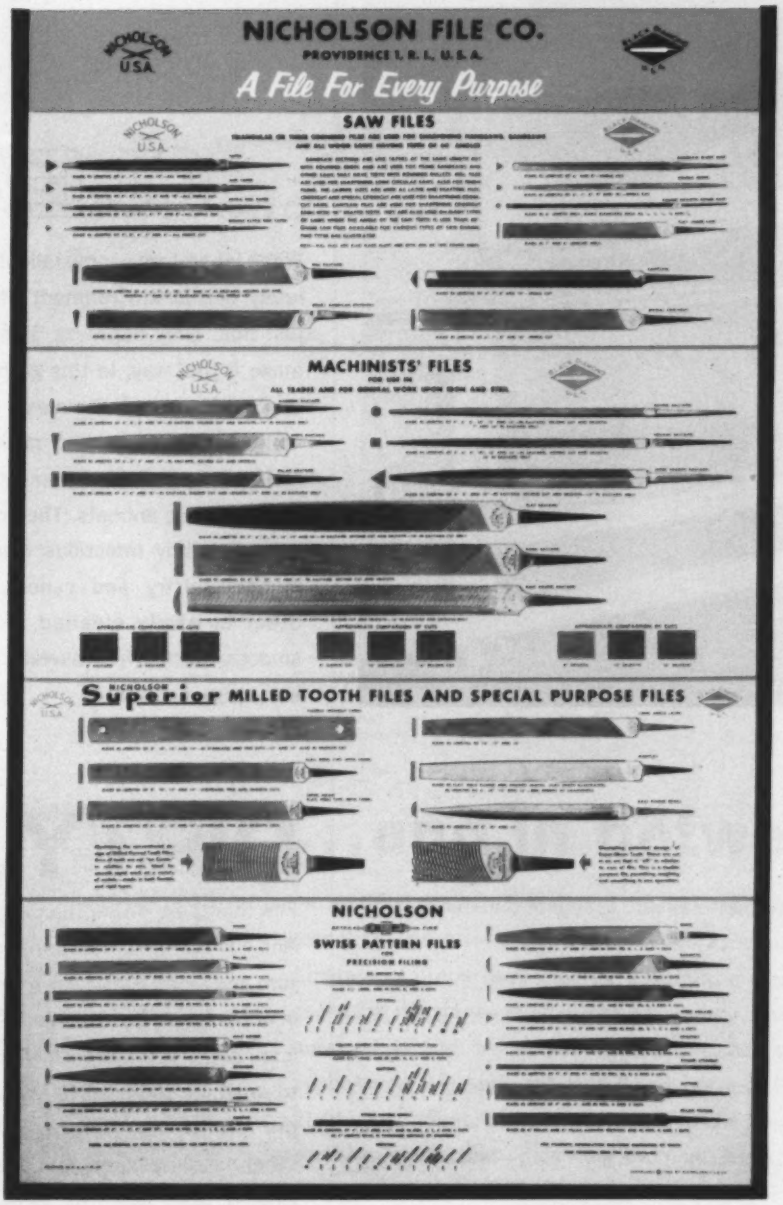
You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Feb. 1, 1961.**

It's Easier with Basketballs

A Johnstown, Pa., reader comments on STEEL's Nov. 7 article, "These Hints May Help You Select a Gas Cleaning System":

". . . In the second sentence of the fourth paragraph, 'As particle size increases, efficiency drops sharply,' I feel the word 'increases' should read 'decreases.' A centrifugal collector is most efficient against large particles and not small."

The editor who wrote the story wore a red face when the correction was brought to his attention. His comment: "I should have remembered my hearthside physics. My wife finds it's easier to pick up the children's blocks than it is to pick up BB shot."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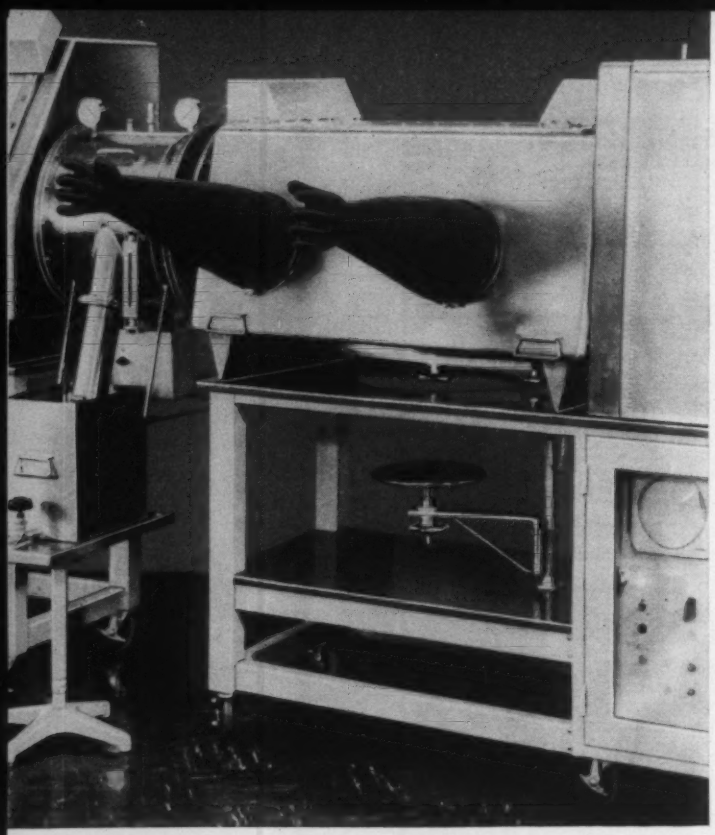
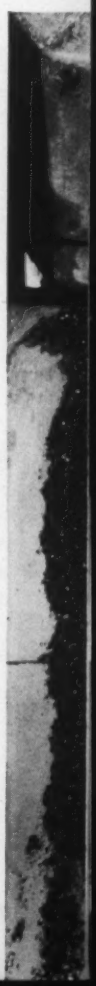


...CLEAN

When laboratory people talk of an "absolutely sterile environment" they mean just that. Only Stainless Steel can help make it that way. In this germ-free system, spot-welded Stainless Steel with molded silicone-rubber gaskets helps maintain a sterile environment for breeding germ-free animals. The apparatus is used to study infectious diseases, immunochemistry and cancer. Stainless Steel is easily cleaned because its smooth, pocket-free surface can't harbor contamination.

DIRTY...

Few things are dirtier than wet coal fines. And corrosive. The combination of moisture and sulfur eats away most materials in nothing flat. Not Stainless Steel. Stainless has exceptional corrosion resistance to anything that can happen in coal or ore processing. Screens, chutes and other handling equipment are easily fabricated from Stainless Steel. Stainless even has what they call "slideability"; its smooth surface prevents build-up and clogging. And it lasts up to 10 times longer than other materials.



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...and in between

No material can match Stainless Steel's versatility. Stainless Steel offers designers and fabricators a unique combination of properties: superior strength, extraordinary corrosion resistance to an enormous variety of reagents, outstanding high temperature properties, and excellent appearance. It is easily fabricated and, because Stainless Steel lasts longer, actually costs less in the long run. If you have a selection or delivery problem, ask your USS representative or nearest steel service center.

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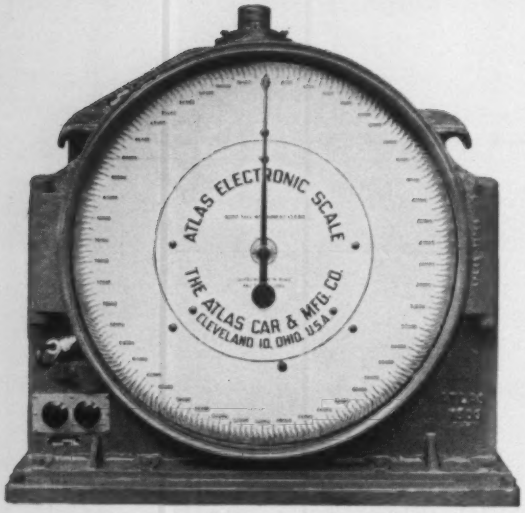
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel



Tape Recording

Chart Recording

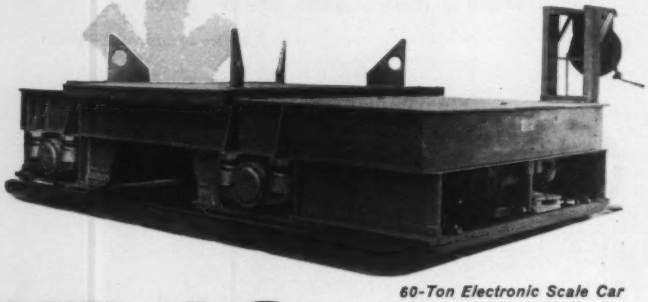
Atlas Builds Electronic Scales for-

Blast furnace scale cars

Coke weighing

Scrap bucket charging

This 60-ton scale car handles scrap buckets from the scrap yard to electric furnaces. For safety, the operator controls the car movement from a remote location. The electronic scale dial is mounted where the crane operator can watch it while loading the car.



60-Ton Electronic Scale Car

ATLAS CAR & MFG. CO.

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CALENDAR OF MEETINGS

Dec. 12-15, Atomic Industrial Forum and American Nuclear Society: Atomic industry exhibitions and conferences, California Masonic Memorial Temple, Fairmont and Mark Hopkins Hotels, San Francisco. Information: AIF, 3 E. 54th St., New York 22, N. Y. Executive manager: Charles Robbins.

Dec. 12-15, Industrial Building Exposition & Congress: Coliseum, New York. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Dec. 28-30, American Marketing Association: Annual convention and exhibit, Coronado Hotel, St. Louis. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive director: Vance E. Lockhart.

Jan. 8-11, Institute of Scrap Iron & Steel Inc.: Annual meeting, Fontainebleau and Eden Roc Hotels, Miami Beach, Fla. Institute's address: 1729 H St. N.W., Washington 6, D. C. Assistant executive vice president: William S. Story.

Jan. 9-13, Society of Automotive Engineers Inc.: International congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Jan. 10, Hoist Manufacturers Association: Annual meeting, Statler Hilton Hotel, Cleveland. Association address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. H. Peritz.

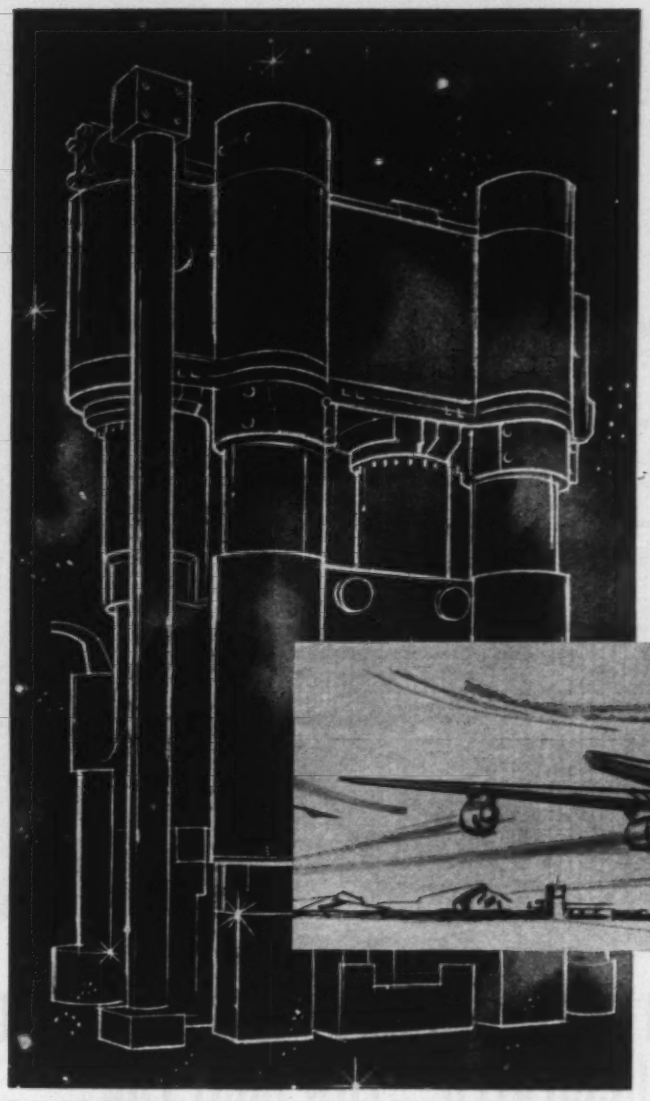
Jan. 17-19, Instrument Society of America: Winter instrument-automation conference & exhibit, Sheraton-Jefferson Hotel and Kiel Auditorium, St. Louis. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kusnick.

Jan. 18, The Metallurgical Society of AIME: Third AIME mechanical working conference, Penn-Sheraton Hotel, Pittsburgh. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Jan. 18, Steel Plate Fabricators Association: Annual meeting, Lago Mar Hotel, Ft. Lauderdale, Fla. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

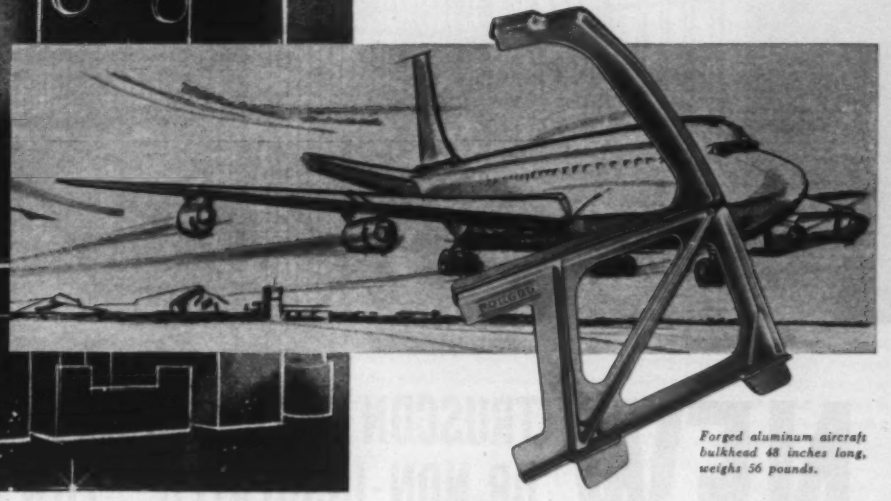
Jan. 19, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 29 W. 39th St., New York 18, N. Y. Secretary: L. K. Wheelock.

Jan. 19-21, Southern Industrial Distributors Association: Mid-year meeting, Palm Beach Biltmore Hotel, Palm Beach, Fla. Association's address: 1626 Fulton Bank Bldg., Atlanta 3, Ga. Secretary-treasurer: E. L. Pugh.



Modern hydraulic forging press exerts 35,000 tons pressure.

HOW FORGED PARTS help airplanes haul bigger payloads



Forged aluminum aircraft bulkhead 48 inches long, weighs 56 pounds.

In an airliner, every pound of weight saved is worth hundreds of dollars ... in revenue-making payload. And in military aircraft, pounds saved mean added miles-per-hour ... or added load carried.

In commercial products ... trucks, cars, materials-handling equipment ... the pounds of dead weight you eliminate by using forgings make money year-after-year for the operator. The forging process lets you put the metal exactly where you need it to carry the load, withstand shock or vibration, endure torsion. And with not a surplus ounce of non-working weight going along just for the ride.

Forged parts are the designer's friend ... strong where strength is needed, lowest in weight, twice-worked by original rolling of the best metals *plus* the hammer blows or high pressures of the forging process.

Write for literature to help you specify, design, and procure forged parts.

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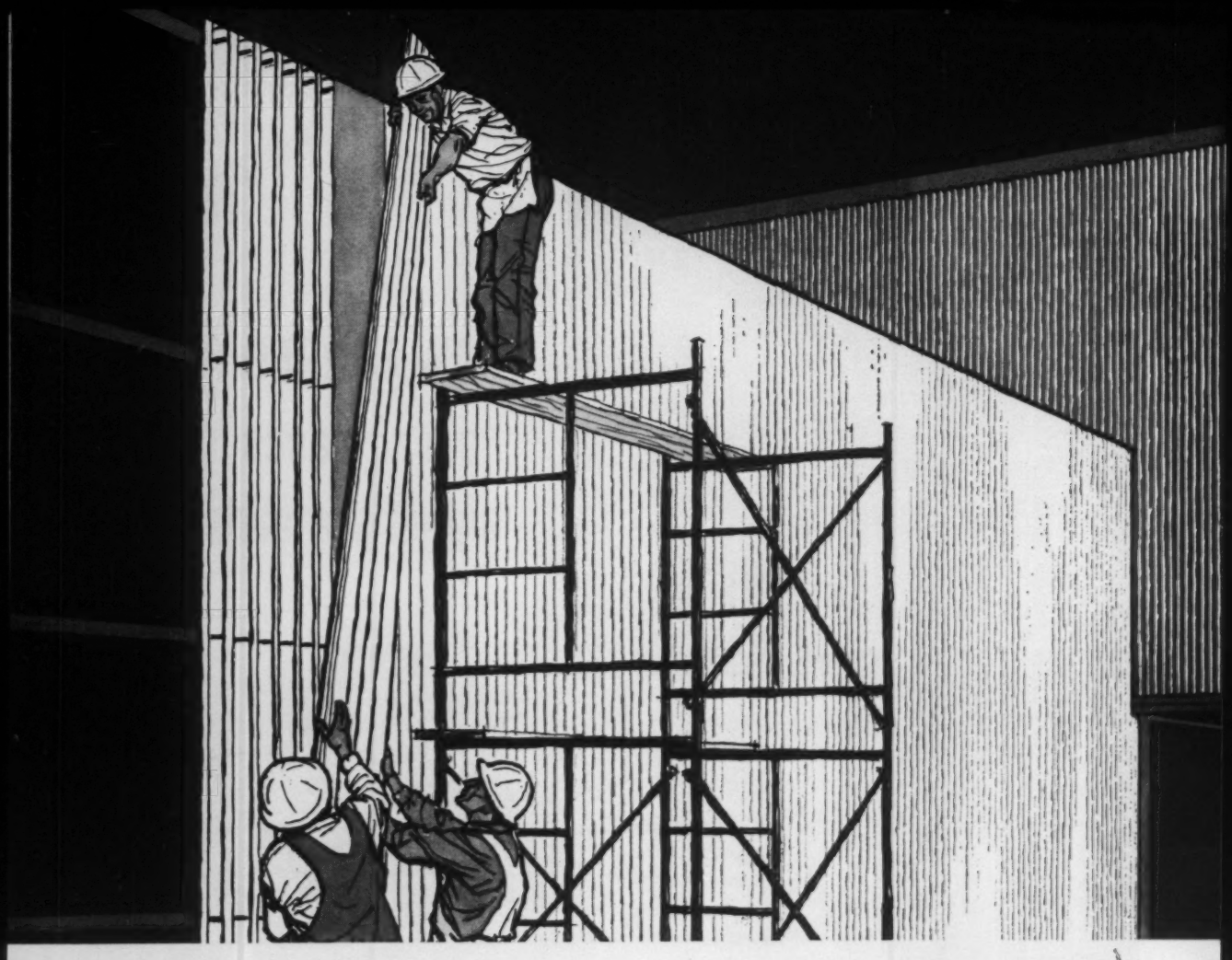
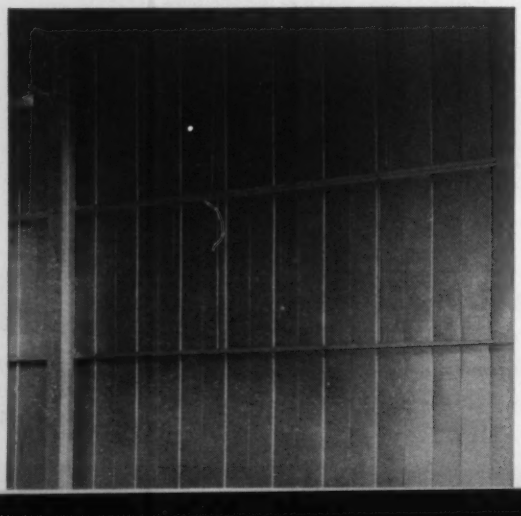


NEW TRUSCON CURTAIN WALL PANELS INSULATED OR NON-INSULATED... LOW COST FOR COMMERCIAL AND INDUSTRIAL BUILDINGS

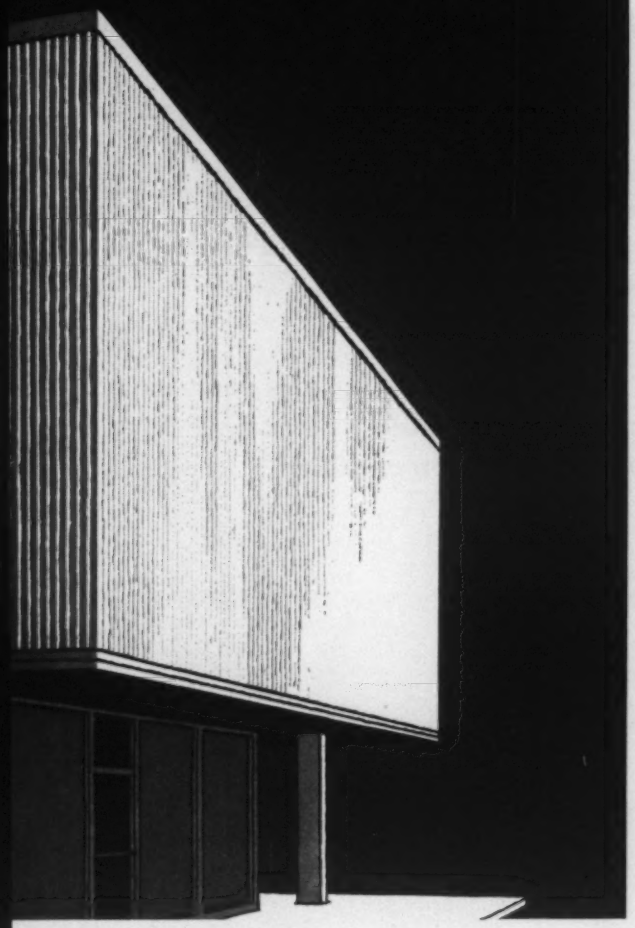
Notice the sharp, clean interior lines presented by Truscon 24″ FERROBORD and Insulated Wall Panels.



Truscon Curtain Wall Panels, insulated or non-insulated, are the answer to fast, economical commercial and industrial housing. Architecturally beautiful to blend with modern industrial park, commercial service and shopping centers.

Truscon Insulated Panels are constructed by sandwiching a layer of insulating material between two sheets of Truscon 24″ Ferrobord® or galvanized ribbed sheeting. Panels are securely interlocked and button-punched for maximum weather-tightness. Panels are furnished painted or galvanized, in widths of 2′-0″, and up to 40′-0″ in length.

Low installation cost, very little maintenance cost, and available for immediate delivery. Call your Truscon representative, or write direct for additional data.



LOW COST SHIPPING: Republic Coil Covers speed and simplify freight handling, protect cargoes in transit, stop vandalism. Designed for use on standard gondola and flat cars. Approximately 22 feet long, 6 feet wide, 6 feet high. Two covers are furnished for each car. Heavy-duty construction, easy to handle by overhead or track-side cranes. Six specially designed stacking brackets permit easy tiering. Call your Republic representative, or send coupon.

FAST, STRONGER, SAFE, LOW COST FRAMING: Republic METAL LUMBER solves framing problems fast. Simply measure, cut, assemble, with bolt and nut fasteners. Slotted angle pattern provides greater flexibility. Ideal for custom-built storage bins, storage racks, work benches, cat-walks. Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths, complete with self-locking bolts and nuts. Order from your Republic-Berger warehouse or write direct for attractive brochure and data.

LOW COST WASH AND CHANGE FACILITIES: Republic Steel Lockers are designed and built for maximum efficiency and economy. Strong, sturdy, steel construction for easy installation, long life, low maintenance. Full inside locker roominess, ventilation, safety. Bonderized. Available in many sizes, colors, and locking systems. And, Republic offers complete locker planning and installation service. Write for complete information.

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World's Widest Range of Standard Steels and Steel Products

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Please send more information on the following products:

- ☐ Truscon Insulated Curtain Wall Panels
- ☐ Republic Steel Coil Covers
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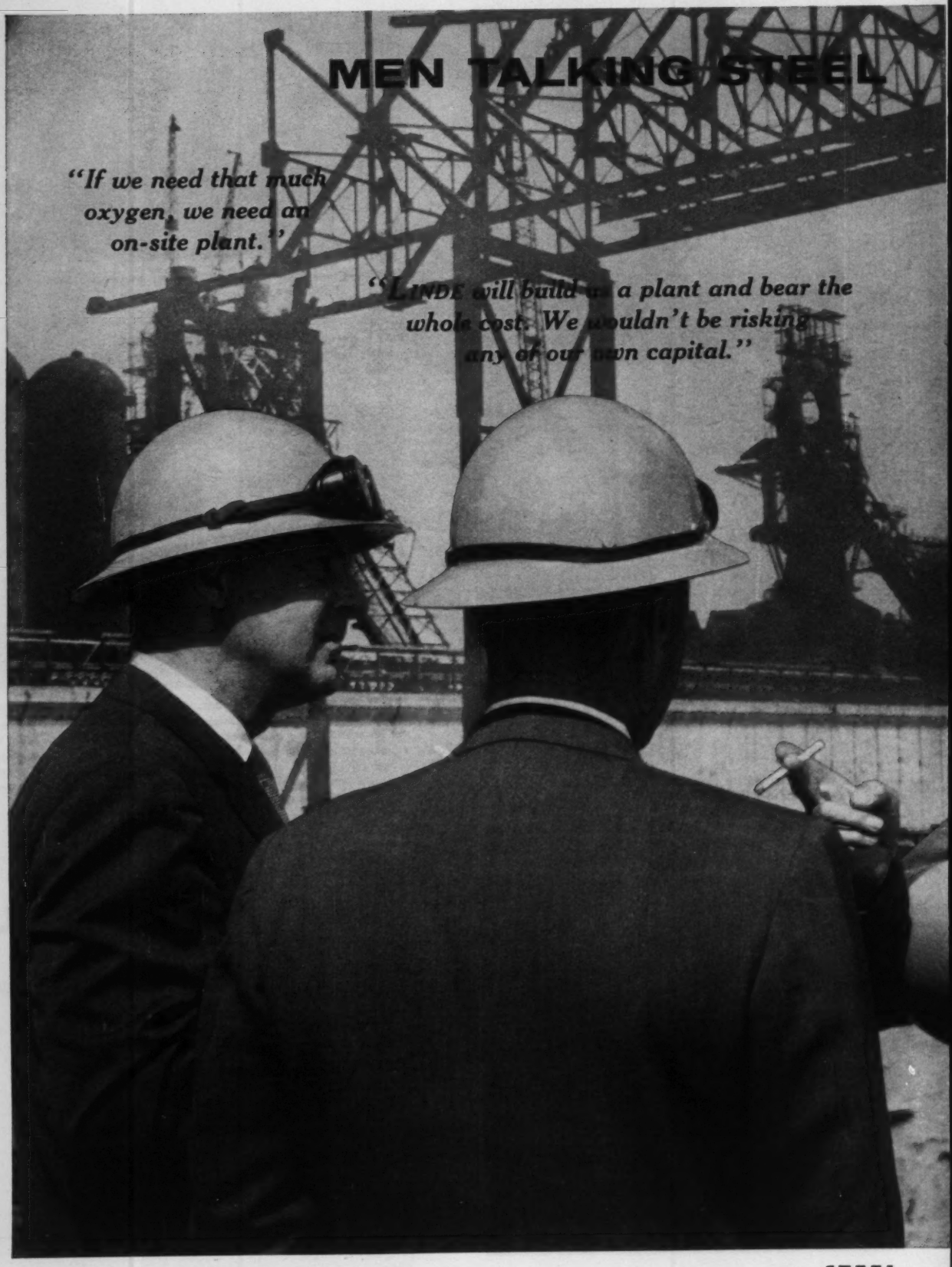
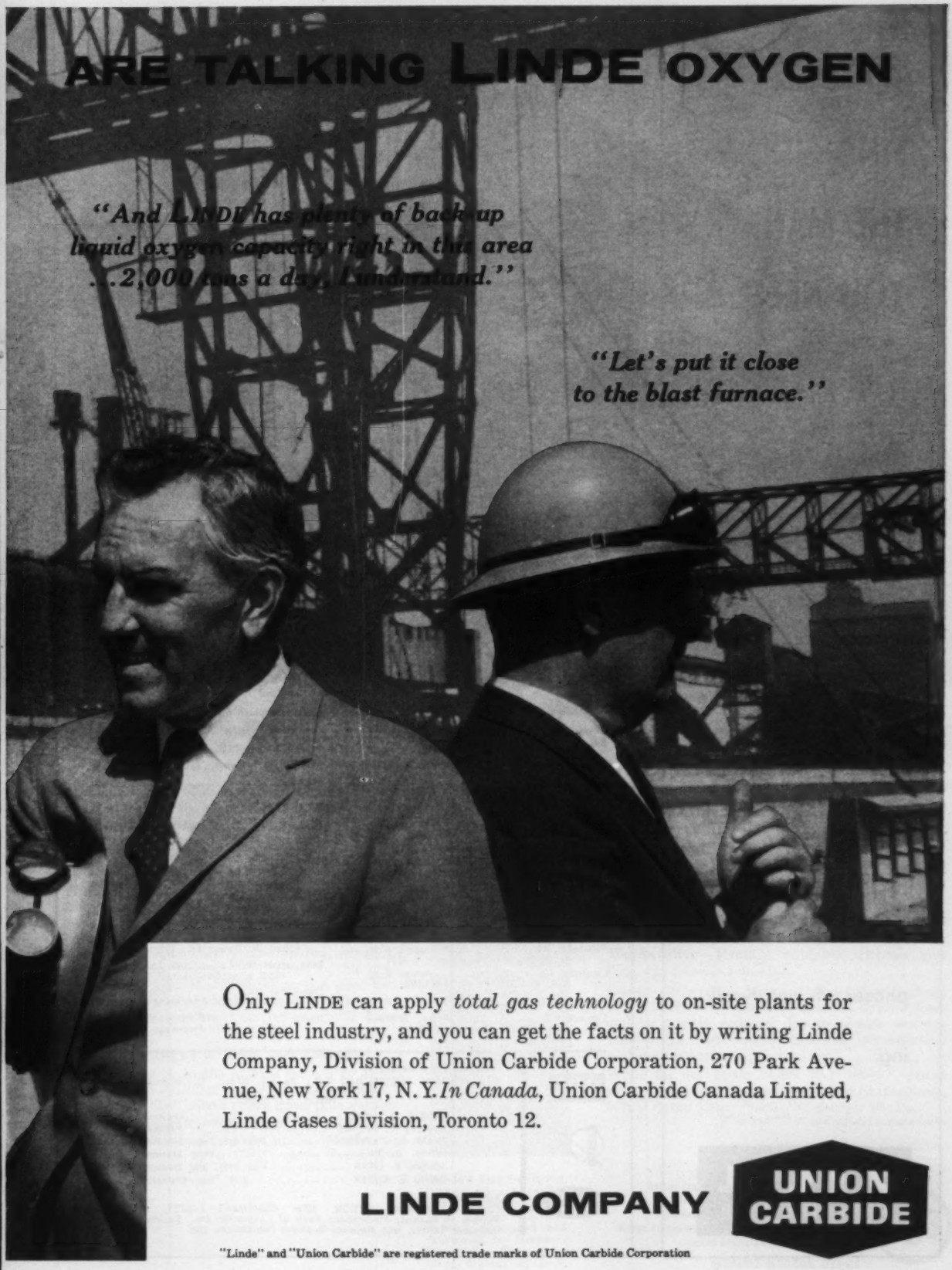

MEN TALKING STEEL
"If we need that much oxygen, we need an on-site plant."
"LINDE will build us a plant and bear the whole cost. We wouldn't be risking any of our own capital."


ARE TALKING LINDE OXYGEN
"And LINDE has plenty of back-up liquid oxygen capacity right in this area ...2,000 tons a day, I understand."
"Let's put it close to the blast furnace."

Only LINDE can apply *total gas technology* to on-site plants for the steel industry, and you can get the facts on it by writing Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada,* Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

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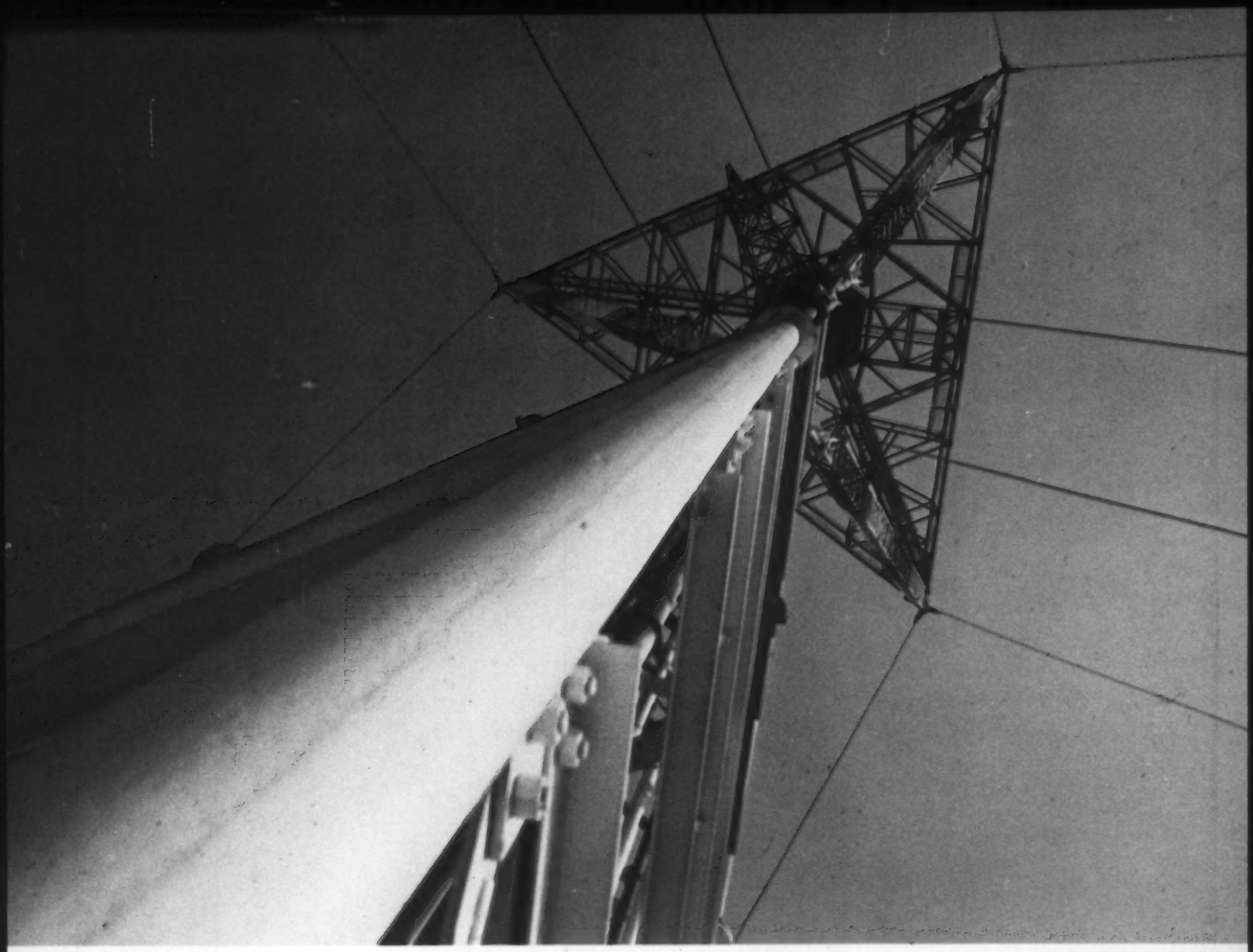


"T-1" Steel cuts size of tower legs 50%

This spectacular, 730-foot, candelabra-type TV tower in Baltimore, Maryland, was built to withstand hurricane winds of 165 mph. The legs had to be *extra* strong to support the weight of three 10-ton antennas plus the weight of a triangular platform 105 feet long on each side.

The designers chose USS "T-1" Constructional Alloy Steel for the legs because its great strength permitted a reduction in leg size of almost 50%. Wind resistance was reduced and only 105 tons of 5¾" to 7" quenched and tempered, straightened and stress-relieved "T-1" Steel rounds were used for the legs. If structural carbon steel had been used, approximately 300 tons of steel in diameters up to about 12 inches would have been necessary.

Chief advantages of USS "T-1" Steel

You may not be in the market for a TV tower, but if you are building large structures or rugged equipment, "T-1" Steel offers these plus values:

Super Strength—Minimum yield strength 100,000 psi in bar diameters up to 4 inches or plate thicknesses up to 2½"—three times the yield point of structural carbon steel.

Resistance to impact abrasion—Very high. Shovel parts, truck liners, conveyor parts, bins, chutes last up to five times as long.

Atmospheric Corrosion Resistance—Four times that of carbon steel. This results in a considerable increase in paint life.

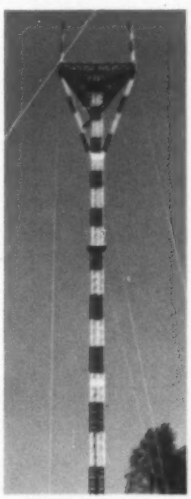
Toughness—Outstanding at both low and high temperatures.

Weldability—Readily weldable without preheating or stress relieving.

Costs—Where the designer takes full advantage of "T-1" Steel's superior properties, overall costs can be greatly reduced due to sizable savings possible in material, fabrication, construction and maintenance.

Write for our book, "USS 'T-1' Steel," which gives complete information. United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and "T-1" are registered trademarks



World's first 3-antenna, candelabra-type TV tower for Baltimore stations WBAL, WJZ and WMAR. Designed and fabricated by Dresser-Ideco Co., Columbus Ohio. Erected by J. F. Beasley Construction Co., Muskogee, Okla.

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
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United States Steel

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This mark tells you a product is made of modern, dependable Steel.

New top for the Shippingport reactor

By the Ohio River at Shippingport, Pa., the United States' first full-scale central station atomic power plant devoted exclusively to civilian needs continues to generate electricity for the Pittsburgh district. In operation since 1957, Shippingport's reactor core received its second "seed" fuel early this year. The pioneer atomic plant is a joint project of the Duquesne Light Company and the Atomic Energy Commission.

The nuclear portion of Shippingport was designed and developed by Westinghouse under the direction of and in technical cooperation with the Naval Reactors Branch of the Atomic Energy Commission. The work was done at the Bettis Atomic Power Laboratory which Westinghouse operates for the AEC.

U. S. Steel's Homestead Plant is supplying the forgings for the closure-head assembly needed to accommodate a new and higher power core being developed by the Bettis Laboratory for Shippingport. As furnished, the 3-piece assembly weighs 81 tons—and every ounce of these USS Quality Forgings have been cast, forged, machined and tested to meet the most rigid specifications.

The reactor's new closure-head assembly for Core 2 consists of a dome, torus, and head flange. The largest piece—the head flange—weighs 41 tons. To insure the highest degree of quality from the start, it was electric-furnace melted from a Ni-Cr-Mo alloy steel, then teemed into a 180-ton ingot in U. S. Steel's vacuum-casting facilities. After top and bottom discard, it was forged to an 85″ octagon; then it was upset to 60″ in height. Next a 30″ hole was punched in it to provide for mandrel forging. This hole was later opened up to take a 36″, and finally a 54″ forging bar. At this point the ring was flattened to 43″, the bar was again inserted in the center and the ring was mandrel-forged to its final dimensions—159″ overall diameter, 98″ interior diameter, and 42½″ high, as shown in the big picture. It then weighed 83½ tons and was ready for heat treating and preliminary machining. Final machining reduced the flange's shipping weight to 41 tons.

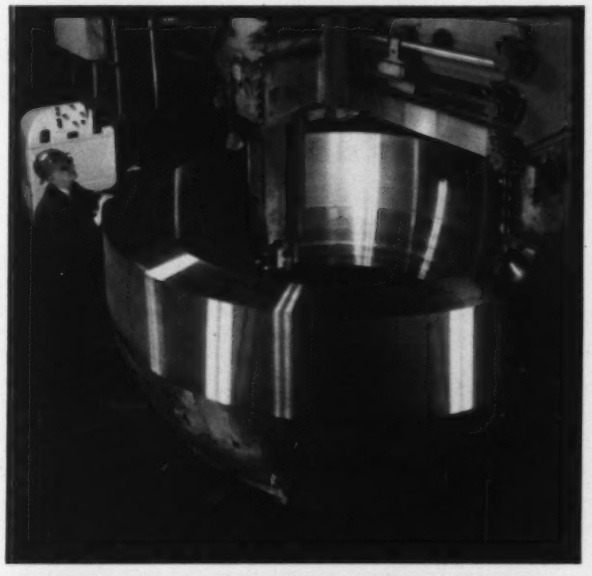
The torus, or "transition ring," was manufactured from the same grade of steel in the same careful, expert manner. It weighs 23 tons after final machining.

The dome is hollowed out on the inside and has a relatively small hole through its middle. This hole will provide a refueling port; separate openings for control rod mechanisms will be bored later. The dome was machined on our 20′ vertical boring mill with the aid of an electronic contouring machine. Final weight of the dome: 17 tons.

Dome, torus and flange were painstakingly tested and inspected every step of the way. Tests included ultrasonic inspection, tangential tension tests, Charpy V notch impact tests, grain size tests, bend tests and magnetic particle inspection.

U. S. Steel has the capacity, the men, and the equipment to manufacture quality forgings like these, whether they be rings, flanges, domes, pressurizers, tube sheets or other such nuclear and power plant components. And the very same men and equipment will be working on *your* order. For a free folder on USS Nuclear Forgings, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark



Photos, top to bottom—
head flange about to be quenched;
torus being contour machined;
ultrasonic inspection of dome.

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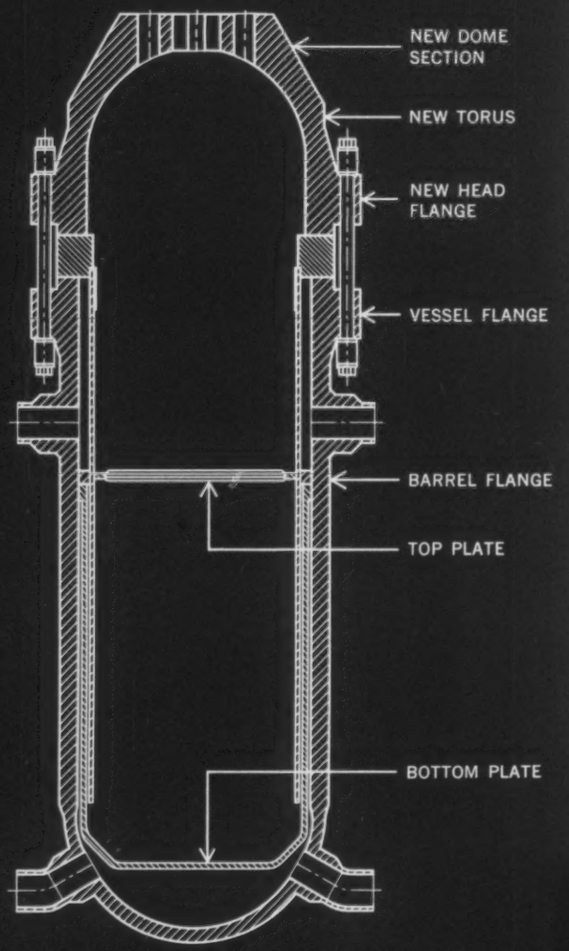
Core 2

FORGED COMPONENTS



Since the three parts of this reactor vessel head—dome, torus and flange—will be welded into a single unit, there can be no allowance for failure. Every square inch of these three USS Quality Forgings were painstakingly manufactured and carefully inspected during and after the manufacturing process to assure perfection. The men, the forging facilities and the inspection equipment are available to you if you need forgings that must be as close to perfection as we can make them.

Have you sent for this FREE book and calculator?

Here is a new book, written in simple language, that describes the "Do's" and "Don'ts" in welding USS "T-1" Steel. Included in the booklet is a handy heat input circular computer that helps you choose the proper welding machine settings. Both will help every welder to do a more reliable job and make his work easier.

USS "T-1" Steel has become famous for three properties not usually found in a single steel: very high yield strength, excellent toughness and good weldability. The booklet will tell you how to weld "T-1" Steel successfully without affecting either its strength or toughness.

The information is based on the experience of our many field service men whose jobs are to help customers fabricate "T-1" Steel. It contains the results of nine years of work with hundreds of users, and shows how to apply common practices in the welding of "T-1" Steel.

As the booklet points out, welding of USS "T-1" Steel is not particularly difficult—but it is different than welding most other high-strength structural steels. To do it correctly requires some basic knowledge of the metal, of the electrodes, and the proper welding procedures.

We'll gladly send you enough free copies of the booklet for your weld shop personnel. Just send the coupon.

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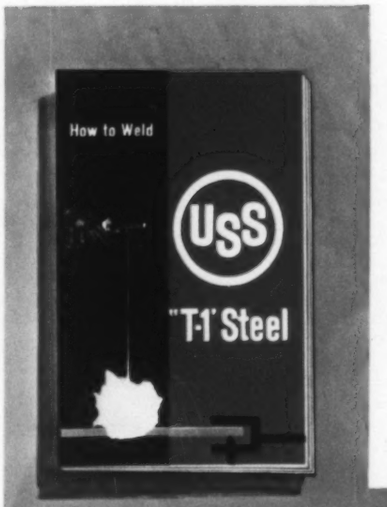

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Gentlemen:

Please send me _____ copies of your new 24-page booklet, "How to Weld USS 'T-1' Steel," including the handy heat input calculator.

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Title _____

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NEW HUGHES MT-3
AUTOMATES JOB LOT PRODUCTION

The new Hughes MT-3 replaces from three to six conventional machines. It drastically reduces costs by bringing production line efficiency to small lot manufacturing of parts requiring face and other milling operations, drilling, boring, reaming and tapping. Operating from numerical instructions programmed on tape, the system functions completely automatically. The MT-3 has an absolute positioning accuracy of ±0.0005". Its part size envelope is a twelve-inch cube, but in many cases will machine parts up to 12" x 24" x 24".

For complete engineering specifications, firm price and delivery dates write, teletype (TWX INGL 4117) or call collect: HUGHES INDUSTRIAL SYSTEMS DIVISION, P. O. Box 90904, Los Angeles 45, California.

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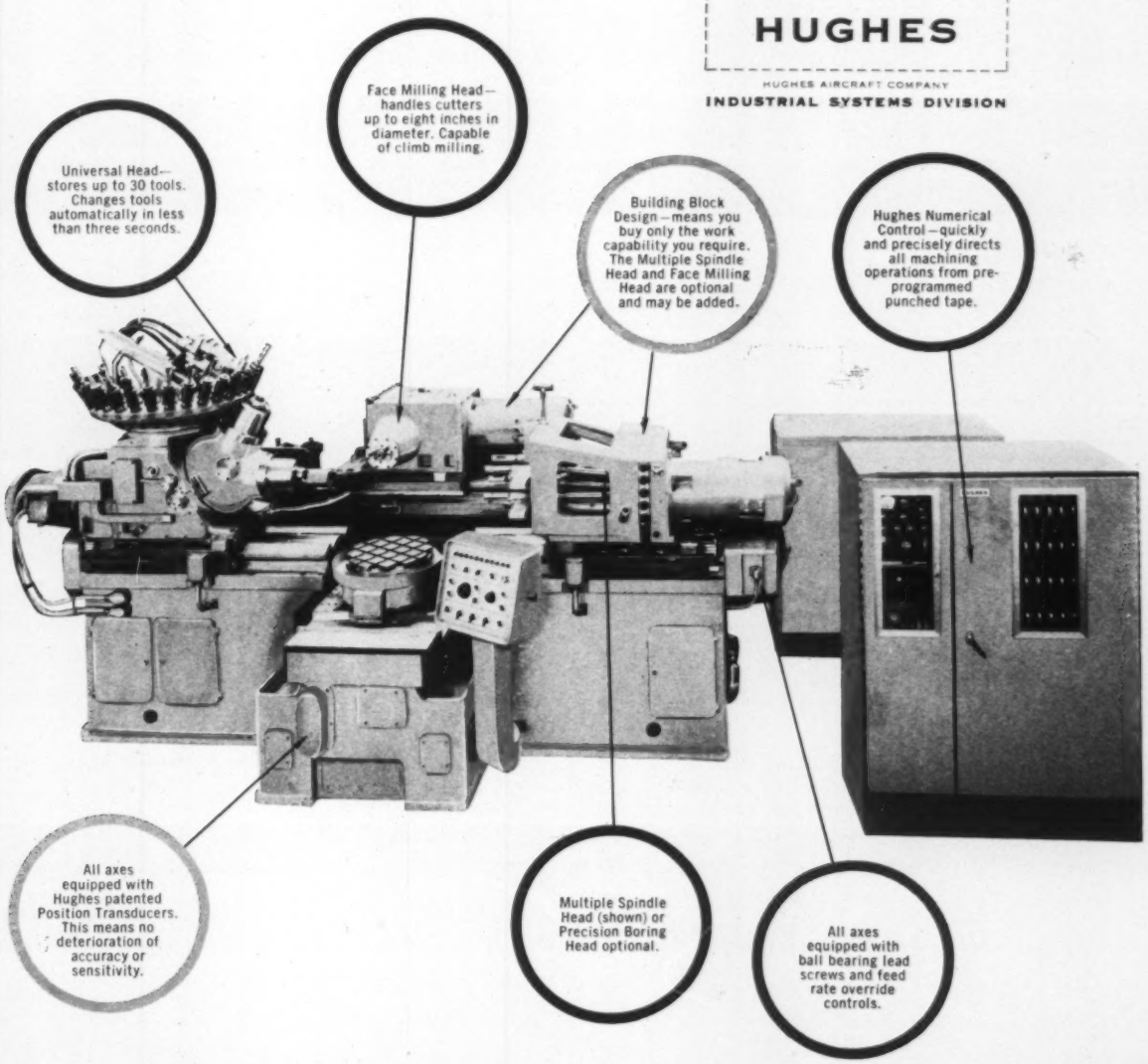

Universal Head—stores up to 30 tools. Changes tools automatically in less than three seconds.
Face Milling Head—handles cutters up to eight inches in diameter. Capable of climb milling.
Building Block Design—means you buy only the work capability you require. The Multiple Spindle Head and Face Milling Head are optional and may be added.
Hughes Numerical Control—quickly and precisely directs all machining operations from pre-programmed punched tape.
All axes equipped with Hughes patented Position Transducers. This means no deterioration of accuracy or sensitivity.
Multiple Spindle Head (shown) or Precision Boring Head optional.
All axes equipped with ball bearing lead screws and feed rate override controls.

"Global Design of Our New Constellation Vacuum Cleaner Calls for Deep-Draw Quality, Excellent-Surface J&L Steel"

... The Hoover Company

The two hemispheres that make up the base and cover of the Hoover Constellation cleaner are each blanked from a flat piece of steel. With a single stroke of a stamping die, The Hoover Company forms perfect shells, 6.037 inches deep, for their Constellation cleaner. Key to this stamping operation is the excellent drawing quality of J&L 22-gage sheet steel.

Despite the severity of the draw, there are no breakage problems, no die mark problems, no "orange peeling" or strain lines.

Successful production of this spherical cleaner is possible because the J&L cold rolled sheet used at Hoover has three essential qualities: (1) Consistent Drawing Quality, (2) Excellent Surface Finish, and (3) No Age-Hardening.

Mr. Ralph O. Ross, Hoover's buyer of steel, believes: "Production would be vastly complicated, if not impossible, without cold rolled, drawing-quality, killed steel sheet. We would be hindered by metal breakage during the stamping operation, and troubled by die marks and surface imperfections on the completed spheres were it not for a number of advantages of the cold rolled sheet."

To get exactly the right J&L steel for special requirements in your own plant, contact your Steel Service Center. Or, write direct to *Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.*

Steel

This Steelmark identifies products made of steel. Place this mark on your products. And—look for it when you buy.

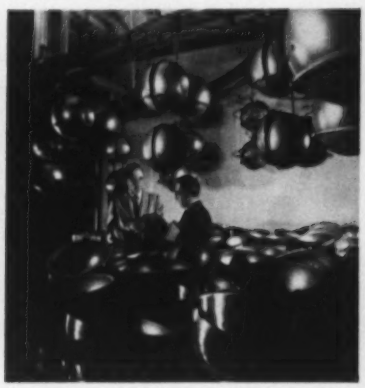
Jones & Laughlin Steel Corporation

3 Gateway Center, Pittsburgh 30, Pennsylvania

J&L STEEL

Above, left, 19-inch blanks are stamped from coils of J&L 22-gage drawing-quality cold rolled sheet steel. Flat blanks go next to a single-stroke drawing press which forms them into spherical shells.

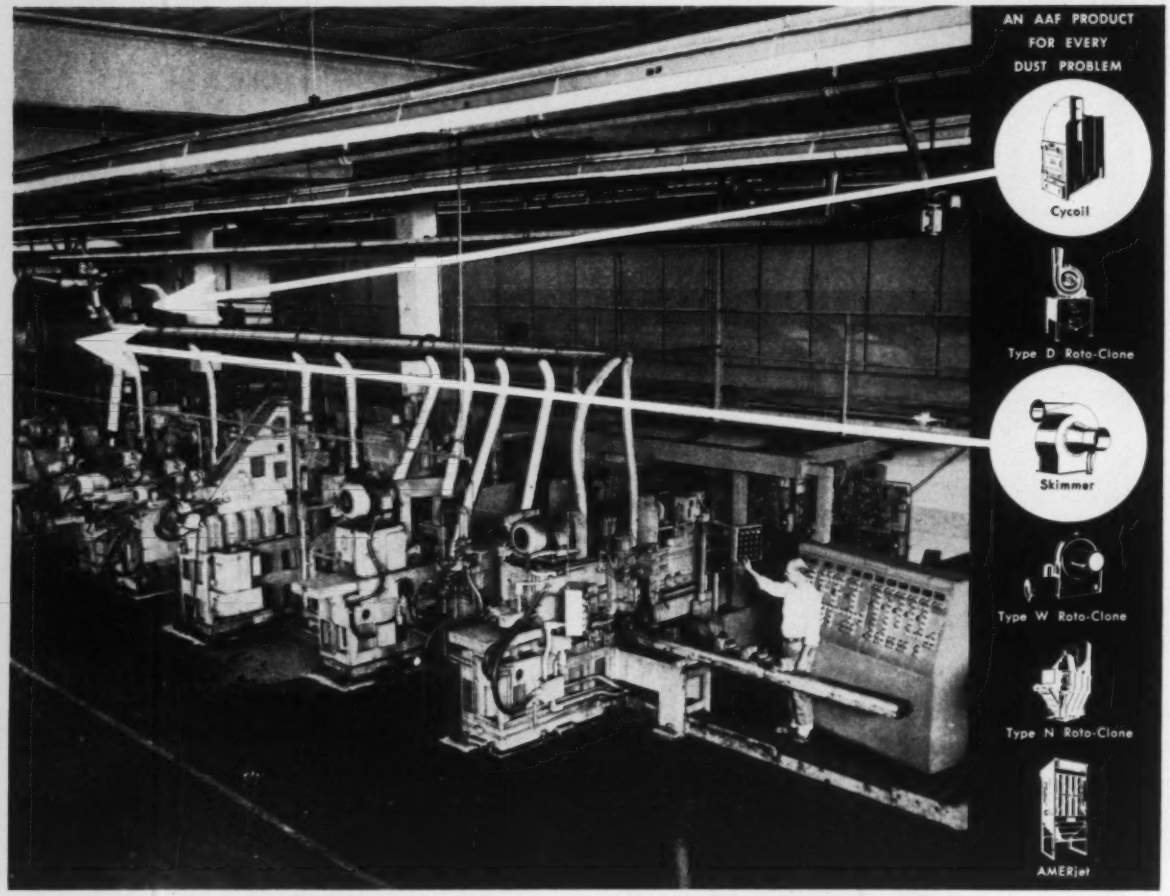
Severe draw forms shells into 6.037 or 6.027 inch deep hemispheres with single press stroke. This operator positions flat blanks and removes stamped shells by hand. Excellent drawing quality of J&L sheet virtually eliminates breakage, strain marks, and "orange peeling" problems.



Surface finishes are examined by Chief Inspector of Finished Products, William Bauman (left), and Steel Buyer Ralph O. Ross. Quality surface finish of J&L sheet has greatly reduced number of shells "wheeled" (ground) before painting.

Final assembly is done by skilled men, each of whom puts together a complete cleaner. Each Hoover Constellation Cleaner is 100% inspected — electrically, functionally, and visually.

DRY MACHINING



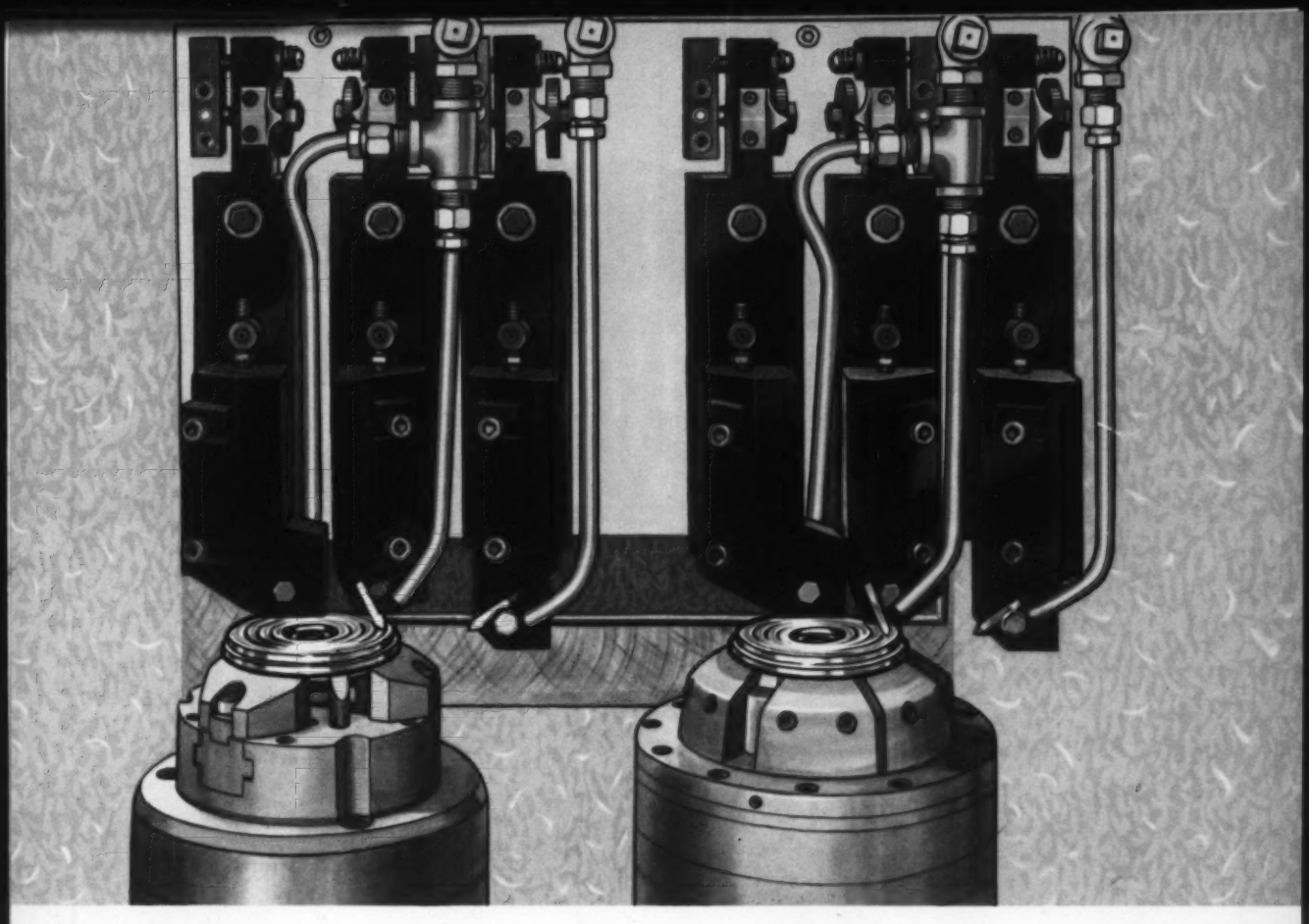
AAF Skimmer-Cycoil team gives new life to dust-laden air

● Motor frames are machined in progressive stages along this automatic transfer machine. Each operation produces dust; each is hooded and its dirty air channeled into an AAF Skimmer pre-cleaner where the bulk of the dust is removed. The partially cleaned air then passes through a high efficiency AAF P-17 Cycoil and is recirculated—*clean*.

AAF's complete line of dust control equipment was application-developed, now challenges *any* metalworking dust problem, regardless of the metal. Where are troublesome dust, fumes or mists causing you trouble—grinding, buffing, polishing, plating, dry machining, wet machining, heat treating, abrasive cleaning? All can be effectively and economically controlled by AAF.

For the answer to your dry machining problem, call your local American Air Filter representative, or write for Bulletins 276 and 285. Address: Mr. Robert Moore, American Air Filter Company, Inc., 443 Central Avenue, Louisville, Kentucky.

AAF American Air Filter
BETTER AIR IS OUR BUSINESS



New Britain's new concept for contour turning and boring

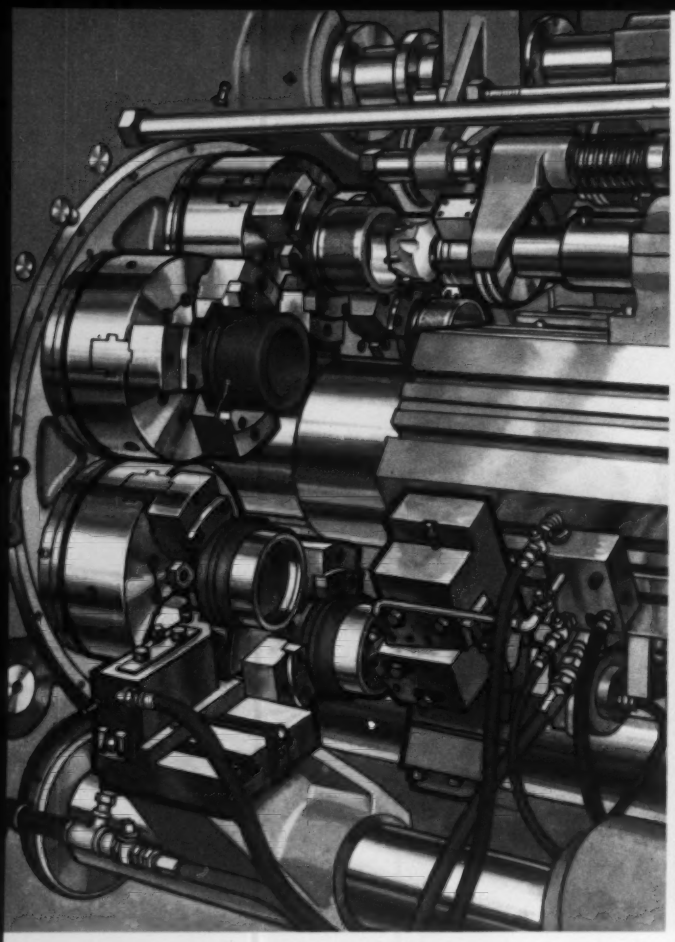
Beyond a certain point, continued refinement of existing designs in machine tools ceases to make an appreciable contribution to performance. Thus in designing our New Series of Vertical Precision Boring Machines, we have incorporated several completely new design concepts to provide improved performance and greatly increase over-all usefulness.

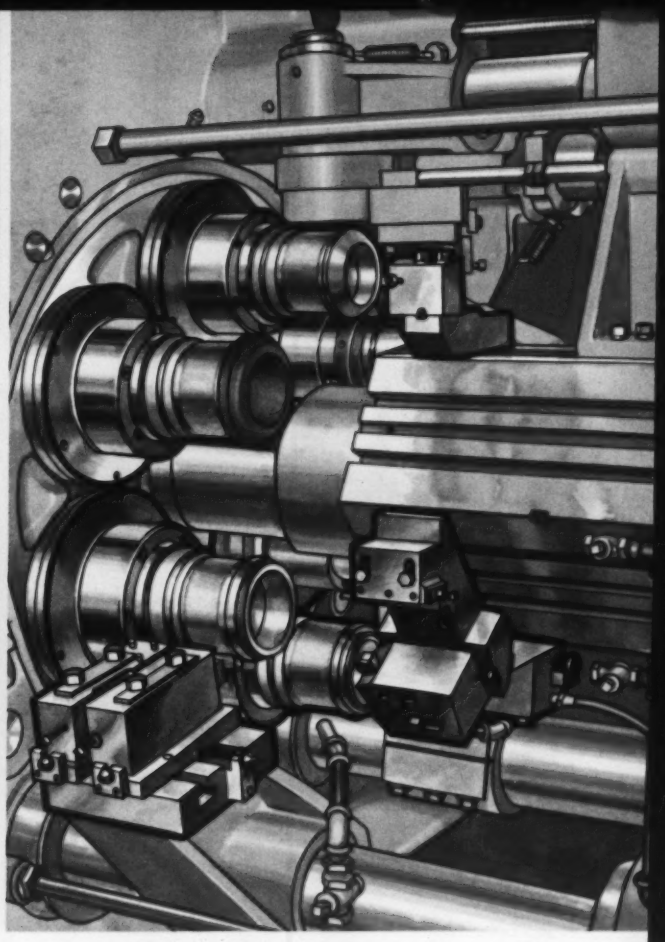
For the first time machines of this type can be used as building block units. Their clean-sided design permits any number of self-contained machines, each with one or more spindles, to be arranged side by side and operated as a single unit. They also may be operated with equal efficiency as individual machines. Parts can be inverted on adjacent machines or on adjacent spindles of the same machine.

In order to take the fullest advantage of the precision inherent in cam control, long linkages between cams and slides have been eliminated. A pair of cams is mounted on a common shaft which is carried *within the vertical slide.* Since all slide actuating forces are contained in the vertical slide, both cams are directly adjacent to the slides they control and no outside forces are imposed on the slide ways. The result is maximum rigidity for heavy cuts coupled with extreme accuracy for close tolerance work.

This unique and eminently workable approach to contour turning and boring results in the highest order of accuracy on even the most complex pieces. Your New Britain Representative can give you details on the nine different models available in this series. For catalog material, write The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Conn.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut





New Britain . . . still the best Chucker you can buy

We're not unhappy about the fact that for years, in many plants, the name New Britain has been synonymous with chuckers. New Britain Chuckers have turned out literally millions of pieces of work for practically every major industry in the world. This is less important to the prospective buyer of one of these machines, however, than the capabilities of these machines today. How do they stack up against other chuckers or even other types of machines capable of doing similar work? Pretty well, we think.

New Britain's open-end design still can't be beat for unlimited accessibility to the tooling area. This same wide-open feature makes it doubly more practical to adapt these machines to automatic loading and unloading.

The unusual combination of longitudinal and transverse forming motions is another unbeatable New Britain feature. The massive forming arms on New Britain Chuckers allow heavier cuts and cuts of much greater complexity. This ability to do more work can eliminate the need for second operation machines in many instances. For really complex work, two chuckers set up side by side, as shown here, each doing one side of the piece, can smooth the way for high production. Less complicated work can be set up to perform both sides of the same piece on a single machine.

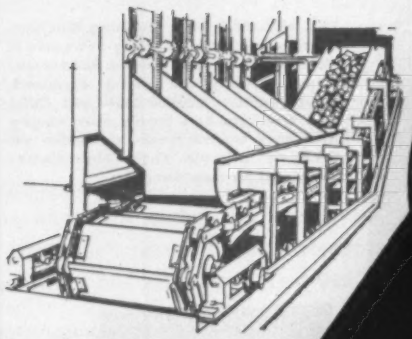
These massive machines provide the tooling combinations, spindle speeds and power to perform the widest possible variety of work. Their basic design will stay new for years to come, continuing to provide profitable operation. You may know New Britain Chuckers, but you may not be fully aware of the improved series presently being offered. Why not call your New Britain Representative or contact us at The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY

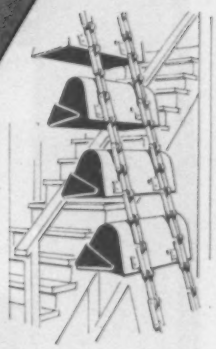
New Britain-Gridley Machine Division - New Britain, Connecticut

LINK-BELT long-pitch SS class bushed chain . . .

BUILT FOR THE LONG, HARD GRIND



FLANGED ROLLER TYPE for applications where the chain will operate on various type rails.



PLAIN ROLLER TYPE for applications where the chain will operate in channels, angle guides or vertically.

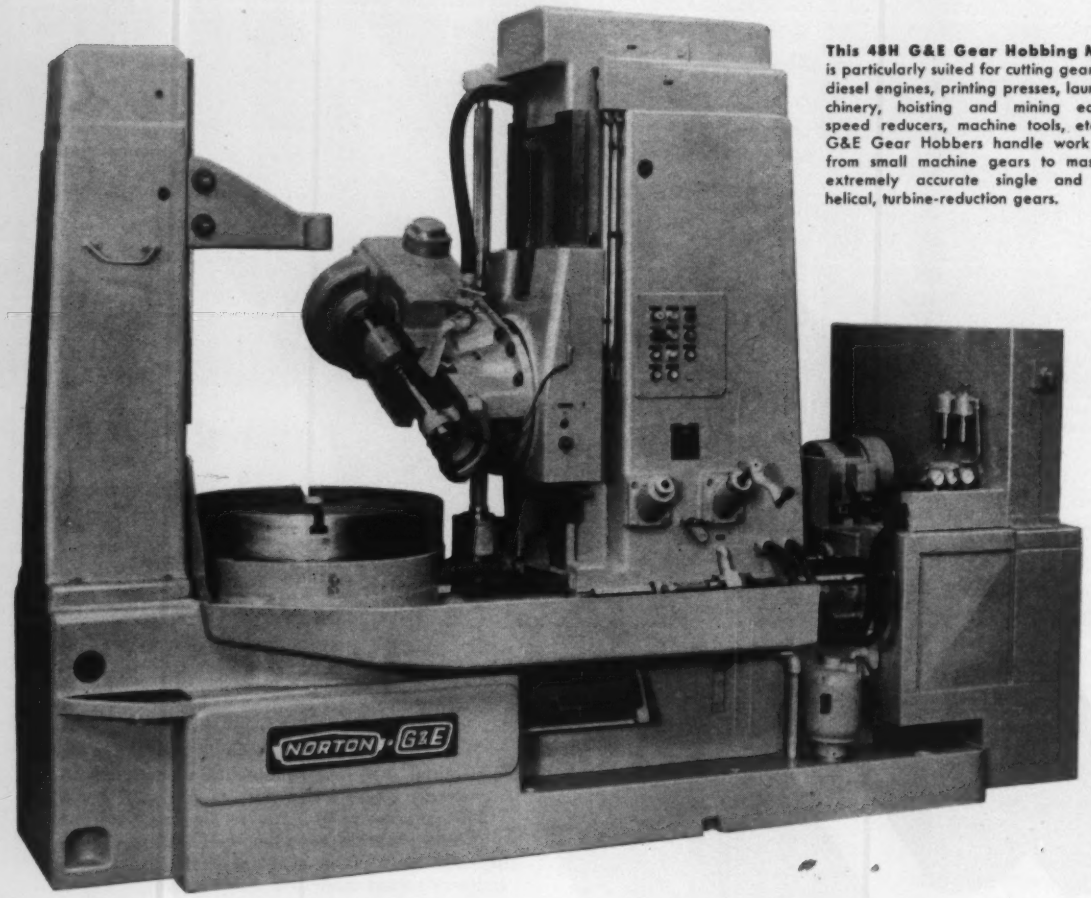
WHERE the going is tough—especially where abrasion and round-the-clock operation are encountered on long, slow-speed conveyors and elevators—long-pitch SS class chain pays off in low initial cost and maintenance, fewer shutdowns. These heavy-duty chains conform to all commercial standards for clearance and fits; pins and bushings have flats and notches to lock them against rotation in the sidebars.

Industry's most modern chain-producing facilities enable Link-Belt to design and build special-type chains and sprockets to suit specific applications. Get full facts from Catalog 1050. Write direct, or call your Link-Belt office or authorized stock-carrying distributor . . . in the yellow pages of your phone book, under CHAINS.

LINK-BELT

CHAINS AND SPROCKETS

How G&E gear hobbers combine high precision with high production...



This 48H G&E Gear Hobbing Machine is particularly suited for cutting gears used in diesel engines, printing presses, laundry machinery, hoisting and mining equipment, speed reducers, machine tools, etc. Other G&E Gear Hobbers handle work ranging from small machine gears to massive yet extremely accurate single and double-helical, turbine-reduction gears.

for your high profits

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Gould & Eberhardt Universal Gear Hobbing Machines meet practically every industrial gear cutting requirement. Built for fast, dependable performance, they're established cost-cutters for rapid production of spur gears, single and double-helical gears, sprockets, splines, worm gears, worms, ratchets and special forms — in a wide range of pitches and diameters.

Highest production at lowest hob cost is assured by the highly developed vertical cutting principle, substantial hob support, gear trains and adjustment features.

And here's a fact it will pay you to remember:

The original productivity and accuracy built into hobbers by G & E is maintained at highest levels — and with every possible advancement — by the assimilation of G & E experience and personnel into the progressive and modern machine tool building operations of Norton Company.

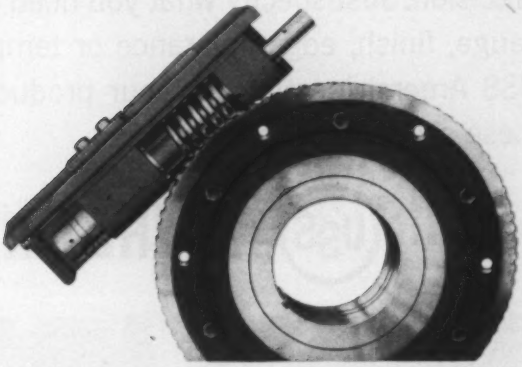
For careful help in selecting Gear Hobbers or other G & E equipment that will benefit your production see your G & E dealer or write to Norton Company, Gould & Eberhardt Division, Worcester 6, Massachusetts.

NORTON
MACHINE TOOLS

75 years of . . . Making better products
. . . to make your products better

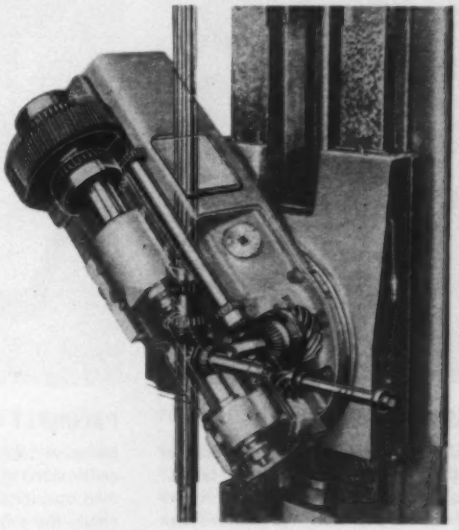
HIGH PRECISION HIGHLIGHTS

Vertical Feed. Optimum accuracy is secured by a large diameter feed screw, precision-cut in a temperature-controlled laboratory and rigidly anchored in tapered, preloaded precision roller bearings. Backlash control is maintained by an easily adjusted two-piece bronze feed screw nut.



Indexing. DUALEAD® worm-gearing assures accurate indexing under heaviest production. The worm thread, with progressive variation throughout its length, simplifies adjustment by providing backlash control without change of center distance and insures uniform transmission of motion in both directions of rotations through proper conjugate tooth action, thus maintaining accuracy of index under high operating speeds and over an extended period.

The maximum wear-resistance quality of the mating chill-cast nickel bronze DUALEAD index worm gear results in minimum wear to maintain extreme accuracy longer.



HIGH PRODUCTION HIGHLIGHTS

Rapid, Precise Hobbing. Speed and accuracy for sustained high production rates — as well as extra-long service life of hobs and machines — are assured in G & E Hobbers because:

. . . The heavily proportioned, easily adjusted hob slide travels on double rectangular guides for sustained accuracy in basic motion.

. . . The single-helical final-drive gear to the hob is independently mounted on large antifriction bearings to prevent compounding stresses on the hob spindle.

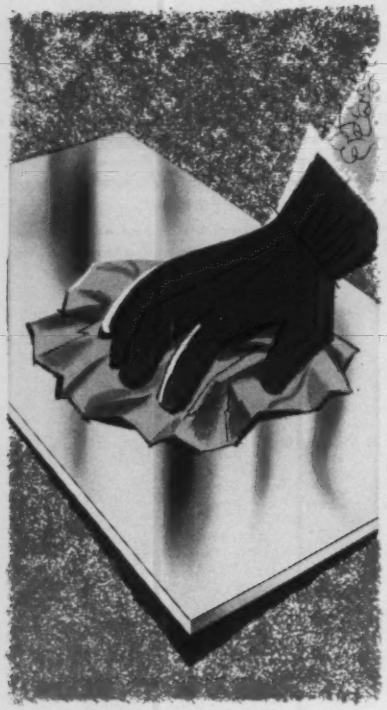
. . . The fixed-position work table is located in a large tapered bearing and supported by a flat annular bearing to absorb cutting stresses.

. . . The hob arbors are heat treated and chrome plated to reduce wear and eliminate the tendency to raise burrs which cause eccentricity and hob wobble.

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

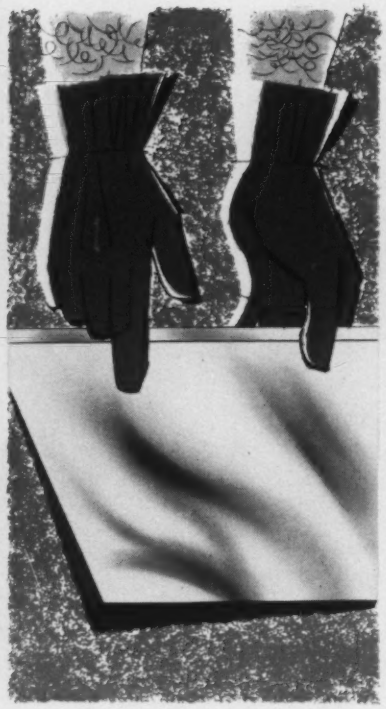
USS Amerstrip—everything about its method of manufacture has the stamp of precision. Just specify what you need in a cold rolled strip, whether it's a precise gauge, finish, edge, tolerance or temper and you get exactly what you specify. USS Amerstrip will keep your product quality high and consistent because of these six distinct advantages:

USS AMERSTRIP GIVES YOU PRECISELY



PRECISION FINISH

With USS Amerstrip we take special pains to give you a finish that is just right for the specific results you require in a finished product. We believe the Amerstrip finish is the finest you can get in the industry.



PRECISELY PREPARED EDGES

Because USS Amerstrip is produced in order-sized quantities engineered to your own specifications, we can give you precisely the edge finish you need. Choose your edge—square, standard, round, full round or bevel.

PRECISE TEMPERS

Whether your product must go through a deep draw or undergo other stringent forming operations, or if it requires a special temper for rigidity, you'll always get the correct temper for the job when you order USS Amerstrip.

Watch United States Steel's special Christmas show, **The Coming of Christ**, in Color on NBC-TV, Wednesday, December 21, 8:30 P.M., E.S.T.

WHAT YOU NEED IN A COLD ROLLED STRIP

PRECISE WIDTH TOLERANCES

When your fabricating machines require a special width strip, you can be sure that's the width you'll get with Amerstrip. We can produce USS Amerstrip within required tolerance limits to fit your special requirements.

PRECISE THICKNESS TOLERANCES

Whatever thickness tolerance your machines demand, you'll get it in Amerstrip. And it'll be precisely the same in every inch of Amerstrip ordered. Amerstrip can be rolled in thickness tolerances of plus or minus .0005 inches.

PRECISE UNIFORMITY

Regardless of the size of your order, every coil of USS Amerstrip comes off the line uniform in finish, temper, width and thickness. In short, USS Amerstrip's precision production assures a continuous run and high yield.

American Steel & Wire Representatives have the training and experience to give you expert guidance in fabrication and application of USS Amerstrip. They can show you how it contributes to a better finished product. To avail yourself of their services, call your nearest AS&W District Office. American Steel & Wire, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS and Amerstrip are registered trademarks

American Steel & Wire
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York

DOW
SOLVENTS

ANNOUNCING...

Chlorothene NU

New stabilizer system solves corrosion problems—makes recovery easy!

Newly developed Chlorothene® NU combines high solvency and safety with an advanced stabilizer system that makes possible an extraordinary range of cold-cleaning applications—makes recovery easy, too!

The exceptional stability of Chlorothene NU (specially inhibited 1,1,1-trichloroethane) practically eliminates corrosion of sensitive metals. You can use it for cleaning aluminum, zinc, and white-metal alloys—as well as other metals, many plastics, rubber products and other materials.

Because increased stability makes recovery easy and practical, you can enjoy the economy of using Chlorothene NU over and over again. In most cases, existing equipment, such as a trichloroethylene still, does an excellent job.

Safe two ways! Low in toxicity, Chlorothene NU has a maximum allowable vapor concentration of 500 parts per million. That's closely comparable to many flammable solvents and is substantially more favorable than most chlorinated solvents. In addition, Chlorothene NU has no fire or flash point, as measured by standard methods. These features not only make Chlorothene NU safer to use—they simplify new cleaning systems and waste disposal.

COLOR CODED—For easy identification, even from 100 feet away, drums of Chlorothene NU are distinctively color-coded in green and white. For more information about Chlorothene NU, call your distributor of Dow solvents. He knows all about its use, recovery and comparative cost. Or contact your nearest Dow sales office.

THE RIGHT SOLVENT FOR THOUSANDS OF INDUSTRIAL USES. Not only is Chlorothene NU recommended for cold-cleaning dip operations on the production line—it also cleans by spray, bucket or wipe methods. It's an all-purpose solvent for many applications, both on the production line and for maintenance use.

SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

The widest line of industrial solvents: Trichloroethylene, Perchloroethylene, Methylene Chloride, Chlorothene NU.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN DOW

Pipe being ultrasonically tested as required by Military Specification MIL-T-18063A (Ships).

SIZE RANGE

Diameter 8" through 28" O.D.
Wall ½" to 4"
Length up to 22 feet
Types of Stainless:
Austenitic grades, including E.L.C.

again "HYDROFORGED" fine-grain stainless piping specified for U.S. NUCLEAR NAVY

—INSTALLED IN NEW U.S.S. ENTERPRISE

U.S. NAVY SERVICE APPLICATIONS INCLUDE: Pipe for valve operating system reservoirs and primary water preheaters.

Primary coolant piping for nuclear submarines and surface ships.

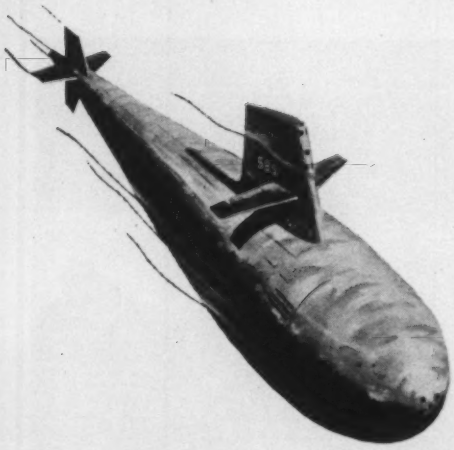
Seamless welding fitting stock for large diameter reactor piping systems for submarines and surface ships.

Demineralizer shells.

Operating conditions in these services are in the range of 700° F. and 2,500 PSI.

THE PROCESS: The starting point is a high quality machined hollow billet, made centrifugally, which is cold expanded by hydrostatic pressures up to 50,000 PSI in specially designed massive metal dies. After "hydroforging," the pipe is given a recrystallizing anneal which results in the grain refinement characteristic of wrought stainless steel.

THE PRODUCT: After final machining of the O.D. and I.D. surfaces to 125 microinch finish, the pipe is subjected to all the testing requirements of Military Specification MIL-T-18063A (Ships) which covers seamless austenitic steel tubes and pipe intended for radioactive system services. This specification includes: chemical analysis, tensile properties (for Type 304 stainless steel—75,000 PSI minimum tensile strength, 30,000 PSI minimum yield strength, 35% minimum elongation), expanding and flattening tests, hydrostatic pressure test, intergranular corrosion test, macro-etch, ultrasonic and liquid penetrant examination.



The U.S.S. Enterprise, our first nuclear-powered super aircraft carrier, can cruise at great speed and for almost unlimited time and distances without refueling. The Enterprise, built by Newport News Shipbuilding and Dry Dock Co., ushers in a new age of mobility and power for air and surface warfare at sea. At left, the Skipjack, nuclear-powered and with revolutionary blimp-shaped hull, is the fastest of the A-Subs. Both vessels utilize hydroforged fine-grain stainless pipe supplied by United States Pipe and Foundry Company.

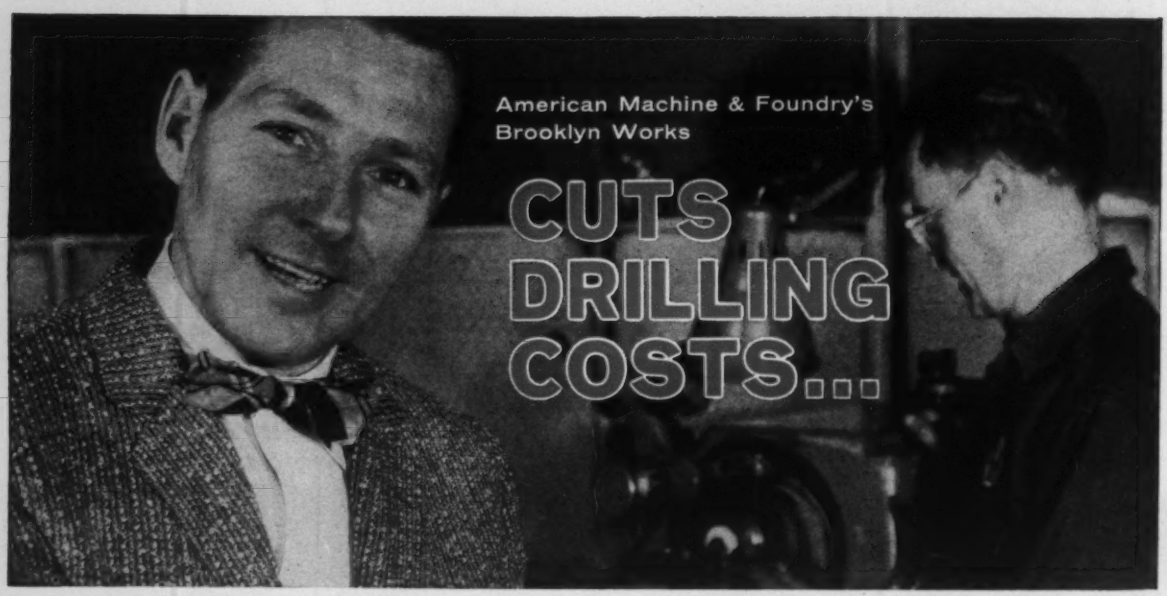
UNITED STATES PIPE & FOUNDRY CO.

Steel and Tubes Division

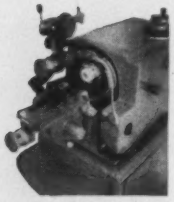
STEEL & TUBES U.S. PIPE DIVISION

BURLINGTON, NEW JERSEY

SALES OFFICES: BURLINGTON, HARTFORD, BIRMINGHAM, CHICAGO, CLEVELAND, DALLAS, LOS ANGELES, NEW YORK, PITTSBURGH, SAN FRANCISCO



Ralph Mazza, Foreman, Tool Grinding and Small Tool Department



At AMF, the Cincinnati SPIROPOINT sharpens spiral point drills for 10 radials, 60 sensitive drill presses and 20 multiple-spindle multiple head units.

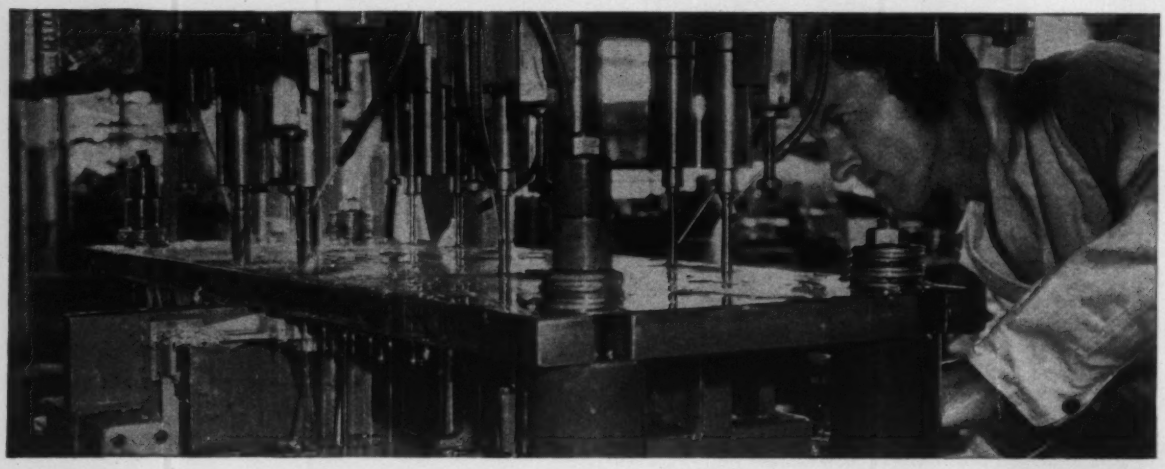
"... 20% more holes per grind"

"... Hole size tolerances of .0015" to .002" on smaller diameters"

"... More than 15% less downtime on our multiple-spindle drilling machines"

"... Less costly fixtures required"

By using Cincinnati SPIROPOINT® Drill Sharpener to apply the new *spiral point* geometry to standard twist drills, AMF reduces drilling costs right across the board—in time, tools, materials, maintenance.

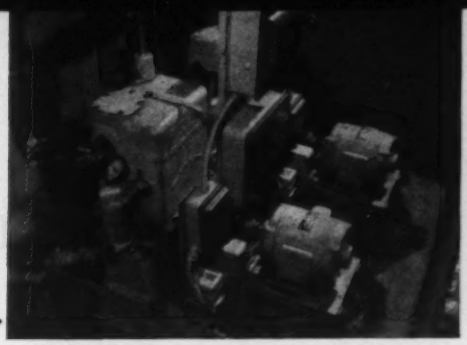


Ask your Cincinnati Lathe and Tool Dealer about SPIROPOINT— or write to us direct.

CINCINNATI LATHE AND TOOL CO.

3207 Disney Street, Cincinnati 9, Ohio

"HYDRASHIFT" Lathes/"CINCINNATI" Drilling Machines/"SPIROPOINT" Drill Sharpeners



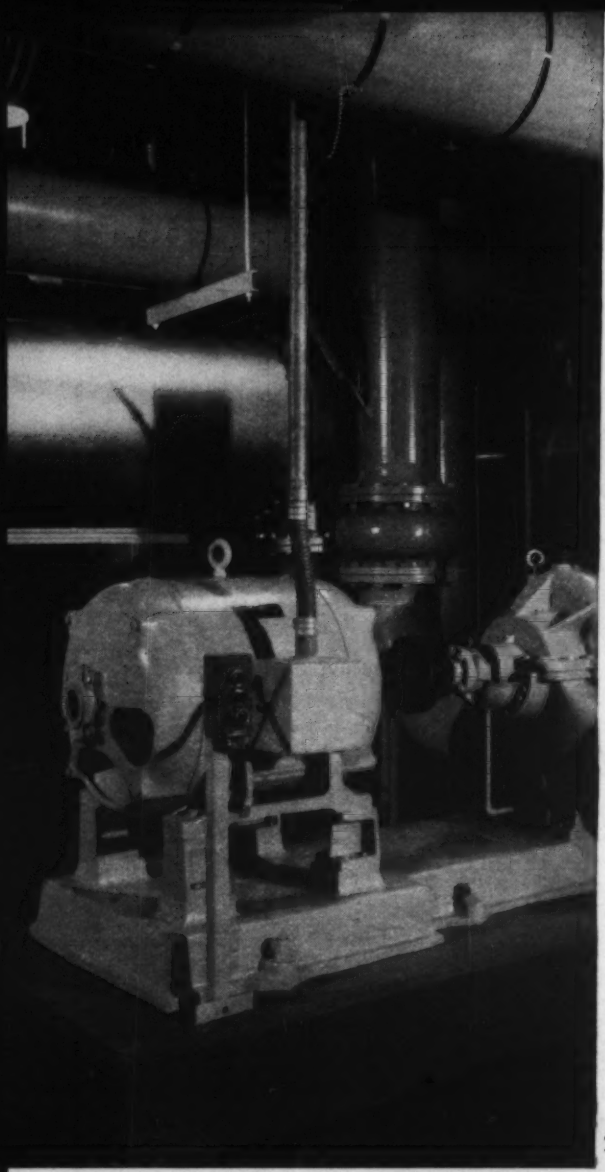
1.

CENTURY MOTORS ARE RIGHT FOR ANY PUMPING JOB

There is a service-proved Century motor for almost every industrial pump application — for centrifugal pumps, condensate pumps, chilled water pumps, reciprocating pumps and many more. Dependable Century motors have been performing outstanding pumping service for years in industrial plants, on farms, in power plants, in heating and air-conditioning units, and on hundreds of other demanding pumping applications.

Century motors have the precise speed regulation important in pumping. And they are exceptionally well protected against dirt, dust, and the severe moisture conditions frequently found in most pump applications.

Century standard squirrel cage motors are shown on this page on typical pump applications at Exchange Park, Dallas, Texas' completely air-conditioned "City within a City".



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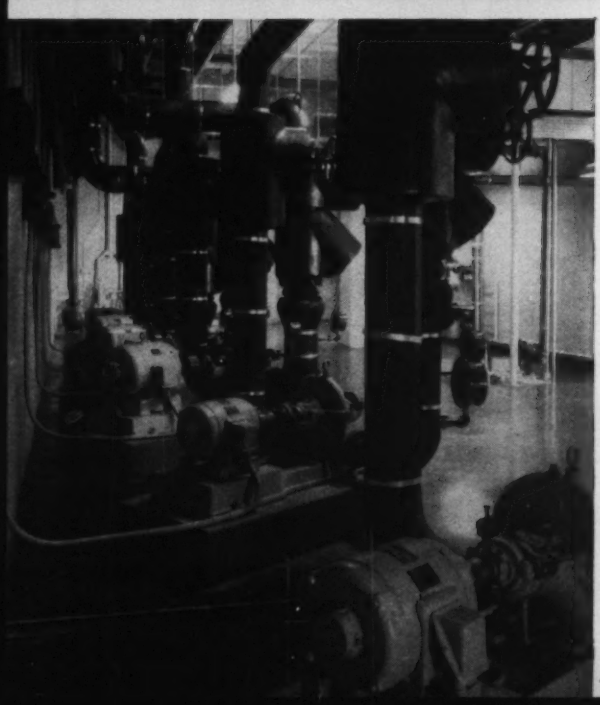


3.

1. **Duplex condensate pumps driven by two Century squirrel-cage 5-horsepower motors. Pumps are in a pit where dust and dirt make motor ruggedness important.**
2. **Century 75-horsepower squirrel-cage motor drives a condensate water pump.**
3. **Six chilled water pumps driven by a series of two Century 5-horsepower motors, two 15-horsepower motors and two 20-horsepower motors are in the power plant of this large commercial development site.**

Century motors on these three pump applications have been operating for years without service or maintenance problems — proof of Century motor dependability.

Century Electric application engineers have years of experience in applying the right motor to your job. Contact your nearest Century Electric sales office or authorized distributor for more information about dependable Century motors.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

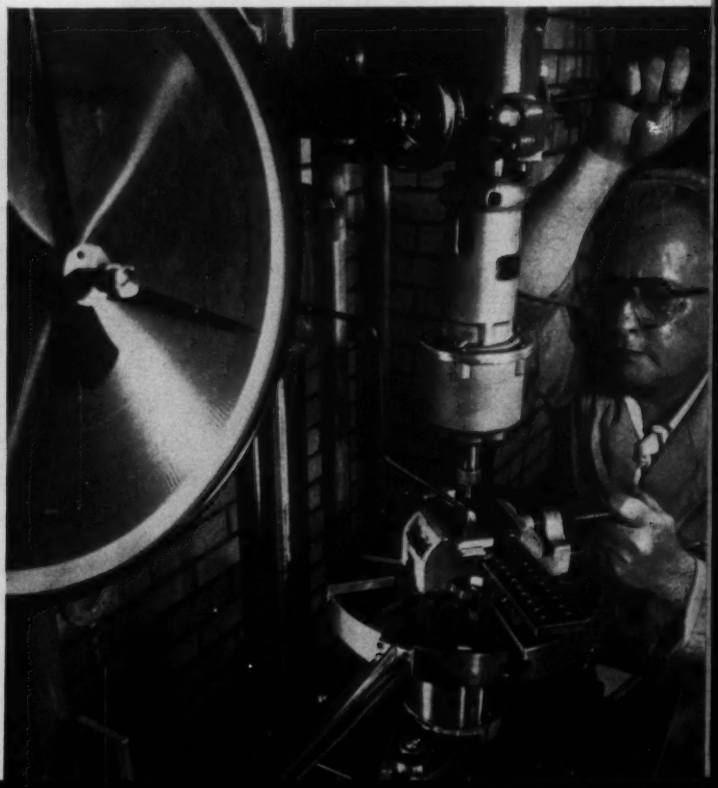
60-11

Announcing a major advance

Mobilmet Oils

the first multi-metal cutting fluids...
with unique pressure-temperature selective activity.

This Tapping Efficiency Tester is one of many Mobil research tools used in the development of cutting fluids such as Mobilmet . . . effectively evaluates the machining efficiency of cutting oils on soft, draggy SAE 1020 steel. On this difficult machining operation as well as in field service, Mobilmet oils have demonstrated results better than conventional cutting fluids intended for this application. Other applications for new Mobilmet oils include: Turning, Drilling, Boring, Milling, Gear Hobbing, Shaping and Shaving, Threading, Tapping, Pipe Threading, Surface and Internal Broaching, Thread and Form Grinding, Thread Rolling, Forming and Special Automatic Screw Machine Operations.



in cutting-oil technology...

Now... from Mobil Research... versatile new cutting fluids that offer you: • greater machine output • lower tool costs • reduced loss from rejects... over wide ranges of metals and operations!

Now, after two years of exhaustive research and field testing . . . new Mobilmet* oils—the first multi-metal cutting fluids ever offered to the metalworking industry.

Mobilmet oils are uniquely versatile . . . help simplify your cutting oil requirements because each grade is effective over ranges of metals and operations beyond the capacity of any conventional product. And Mobilmet oils offer you superior machining results as well—in terms of improved finishes, longer tool life, and reduced staining.

Behind this versatility and effectiveness: a new additive composition, developed and patented by Mobil, which is *pressure-temperature selective* in its activity—highly effective over the wide ranges of cutting pressures and temperatures produced in machining various metals with greatly different physical characteristics. As a result, Mobilmet oils are useful for both tough, draggy metals and hard, brittle metals.

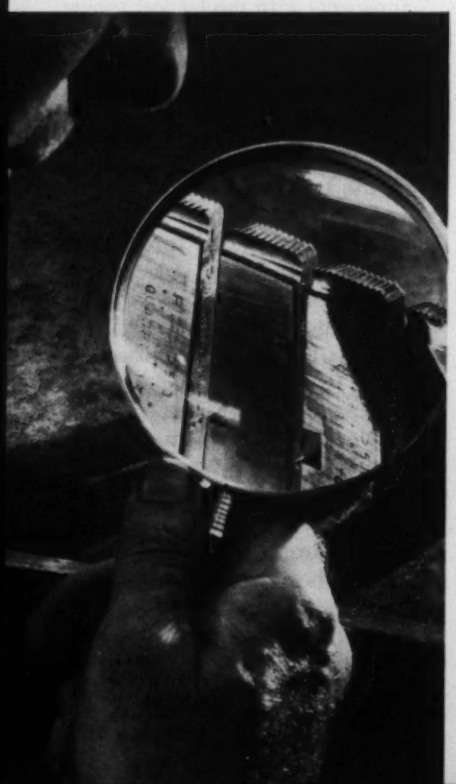
Call your Mobil Representative, or use the coupon below.

Mobil

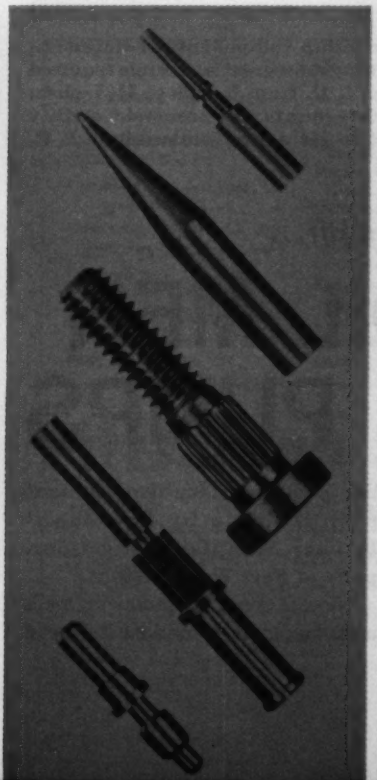
*Mobilmet is a trademark of Socony Mobil Oil Company, Inc.

MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

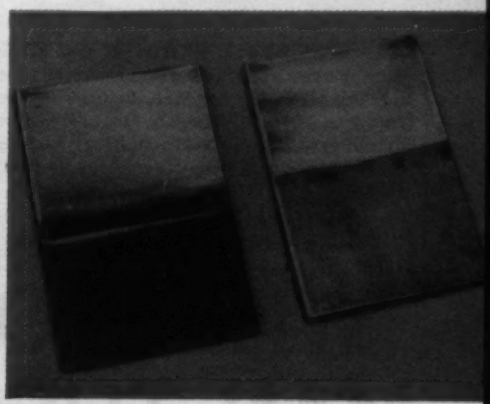
Mobilmet oils offer superior tool life on both soft, draggy metals and hard, clean-cutting materials. These pipe threading chasers used for six weeks in moderately severe job-shop service show little wear on either tool faces or thread crests. Results were achieved with heavy-duty Mobilmet oil.



Since they effectively control built-up edge and tool wear, Mobilmet oils provide superior finishes that meet exacting specifications—with fewer rejects, and in some cases reduced necessity for additional finishing operations.



Stain-inhibiting effect of new additive combination is demonstrated with two steel plates. Plate on the left was immersed in conventional corrosive cutting oil; plate on the right was immersed in heavy-duty Mobilmet grade intended for the same application. Re-polished tops of plates show original condition.



Mobil Oil Company, Room 2057-D
A Division of Socony Mobil Oil Company, Inc.
150 East 42nd Street, New York 17, N. Y.

Gentlemen: I am interested in learning how Mobilmet oils can improve metal-cutting operations at my plant. Contact me about setting up an evaluation program.

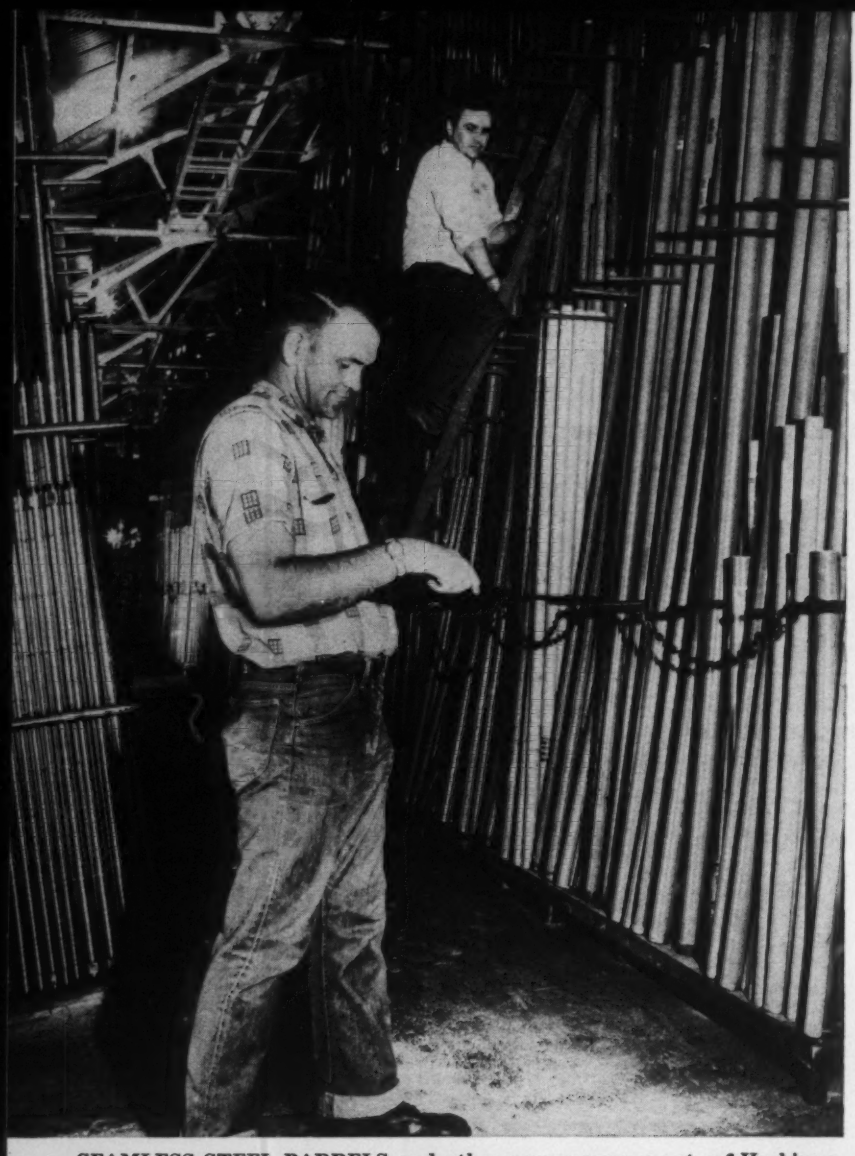
*Name*_____

*Position*_____

*Company*_____

*Address*_____

*City*_____ *State*_____



SEAMLESS STEEL BARRELS and other pump components of Harbison-Fischer's rod and tubing displacement pumps show great size range required to bring oil to the surface. Pumps vary on I. D. from ¾ inch to 5¾ inches; from 3 to 42 feet in length. Harbison-Fischer counts on commercial quality Pittsburgh Seamless Mechanical Tubing to get a 4 to 6 micro-inch I. D. finish with minimum clean-up expense.

Pittsburgh Seamless Tubes Give a Lift...

WHEN OIL MEN MAN THE PUMPS

When the gusher quits gushing and the oil flow slows to a trickle, it's time for oil men to man the pumps.

Pittsburgh Steel Company helps give them the lift they need with seamless mechanical tubing for sub-surface displacement pumps made by Harbison-Fischer Manufacturing Company of Fort Worth, Texas.

Nine of every ten producing wells must be pumped—and most depend on slender, precision-made rod and tubing pumps for efficient oil production. Harbison-Fischer has supplied them to the oil industry for more than 25 years—"The Best Pumps in the Oil Patch."

Among its eight types and wide range of sizes, there's a Harbison-Fischer pump to match every lifting job and well condition, whether it be depth, heat, pressure, corrosion or abrasion.

Pittsburgh Seamless Mechanical Tubing forms the pump barrel that contains plungers and valves. Besides destructive conditions below surface, barrels often must bear the weight (5 to 6,000 psi) of a fluid column of oil 10,000 feet or more deep.

● **Tight Specs**—To meet rigid API standards as well as its own manufacturing needs, Harbison-Fischer requires mechanical tubing with exact chemical and physical properties, and close tolerance I. D. and wall dimensions.

It demands tubing that is exceptionally straight, free of seams, laps and pits; made of steel that is machinable, and—in the high carbon range—fine grained and hardenable.

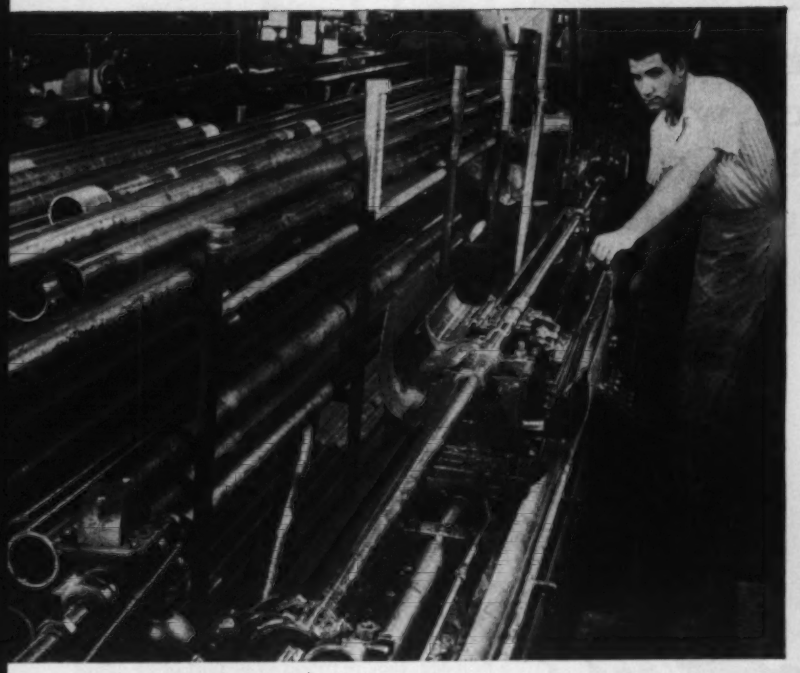
Pittsburgh Steel answers these requirements with mechanical tubing in C-1015 and C-1040 grades in commercial quality to help Harbison-Fischer hold processing to a minimum.

● **Fine I. D. Surface**—In production, Harbison-Fischer wants minimum stock removal to obtain a mirror I. D. finish and extreme straightness.

On its dozen long-stroke hydraulic hones, H-F holds the I. D. stock removal to a few thousandths of an inch. Says Harbison-Fischer:

"The honed I. D. must be entirely free of pits. We want a four to six micro-finish. So you can see why the tubing's I. D. mill finish is important."

After threading and honing, every barrel is re-straightened to a tolerance of .015 TIR (total indicator



STRAIGHTNESS, CLOSE TOLERANCE wall thickness and absence of seams, laps and pits in Pittsburgh Seamless Tubing mean fast, easy clean-up on horizontal hones. Minimum stock removal in honing tube's inner surface results in a mirror finish. Six-foot tube being set up here will become working barrel of two-inch tubing pump.

HONED TUBE GETS RIGID INSPECTION. Inspector uses I. D. micrometer to make certain barrel of 3-inch tubing pump stays within tolerance limits of −.0000/ +.0015 inch.

PRODUCTION PERSONNEL check wide variety of tubing used by Harbison-Fischer to produce "Best Pumps in the Oil Patch" for world-wide market.

reading) to overcome distortion caused by working of the tubing.

For installations where hard pumping and hard wear are factors, Harbison-Fischer heat-treats high carbon barrel tubing by an exclusive electronic process. The process penetrates the I. D. a predetermined depth to produce exceptional wearing quality, while permitting the O. D. to remain ductile and shock resistant.

Applications such as Harbison-Fischer's are typical of the uses to which Pittsburgh Seamless Tubing is put. There are thousands of them.

If you manufacture cylindrical products or parts requiring close tolerance, smooth surface or specific physical properties, Pittsburgh Seamless Mechanical Tubing can save you time and processing costs. Contact one of the district offices or distributors listed at the right. A Pittsburgh Steel representative will show you how.

Pittsburgh Seamless Distributors

Baker Steel & Tube Company
Los Angeles, California

Chicago Tube & Iron Company
Chicago, Illinois

Cleveland Tool & Supply Co.
Cleveland, Ohio

Drummond, McCall & Co., Ltd.
Montreal, Quebec, Canada

Edgcomb Steel Company
Philadelphia, Pennsylvania

Gilmore Steel Corporation
San Francisco, California

Earle M. Jorgensen Co.

Kilsby-Tubesupply, Division of
Republic Supply Co.
of California
Los Angeles, California

Mapes & Sprowl Steel Co.
Union, New Jersey

Metal Goods Corporation
St. Louis, Missouri

Miller Steel Company, Inc.
Hillside, New Jersey

A. B. Murray Co., Inc.
Elizabeth, New Jersey

C. A. Russell, Inc.
Houston, Texas

Ryerson, Joseph T. & Son, Inc.

Solar Steel Corporation
Cleveland, Ohio

Standard Tube Sales Corp.
Brooklyn, New York

Steel Sales Corporation
Chicago, Illinois

Tubular Sales
Detroit, Michigan

Tubular Service Corp.
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Ward Steel Co.
Boston, Massachusetts

Ward Steel Service Company
Dayton, Ohio

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta, Chicago, Cleveland, Dayton, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Tulsa, Warren, Ohio

"Our people jumped at the chance when we offered the Payroll Savings Plan"

"We invited every employee in the company to come along with us on the Payroll Savings Plan and invest in U.S. Savings Bonds regularly. The response was excellent. People appreciate having the tough job of saving done *for* them—and a lot of them took time to thank us for it. And besides feeling good about building a nest-egg, they're proud to be part of an effort that helps keep our country strong. This Plan makes them feel they 'belong,' and that's the best kind of personnel relations."

If your company hasn't gotten around to putting in the Payroll Savings Plan, contact your State Savings Bonds Director and let him show you how simple the Plan really is. Get his experienced help in presenting the Plan to your organization. Or write Savings Bonds Division, U.S. Treasury Department, Washington, D.C.

ALL U.S. SAVINGS BONDS—OLD OR NEW—EARN ½% MORE THAN BEFORE

STEEL
The Metalworking Weekly

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

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STAINLESS STEEL

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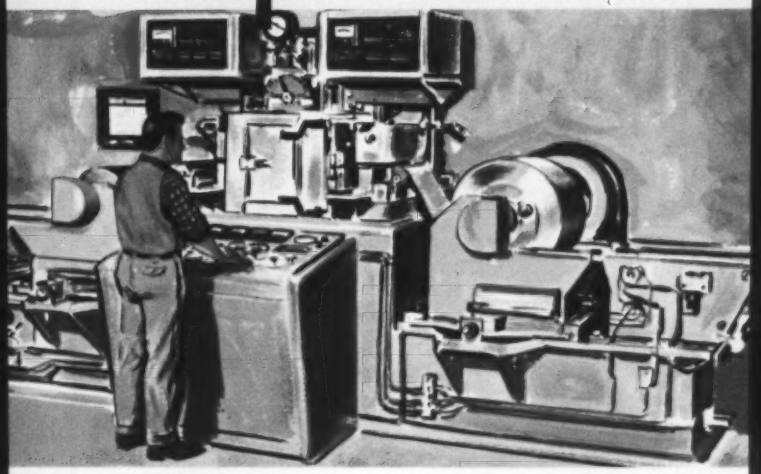
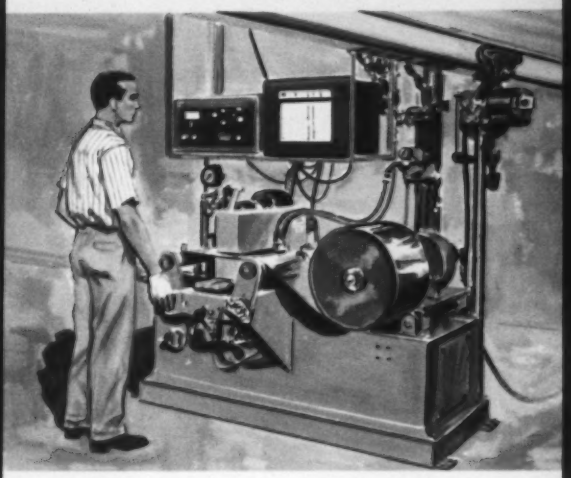
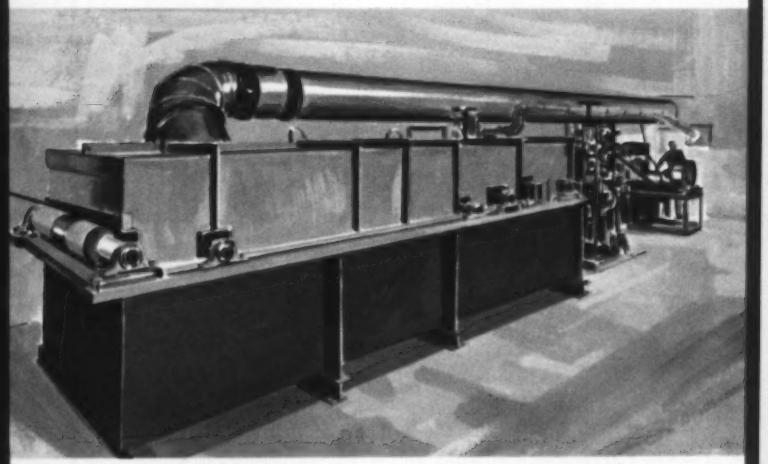


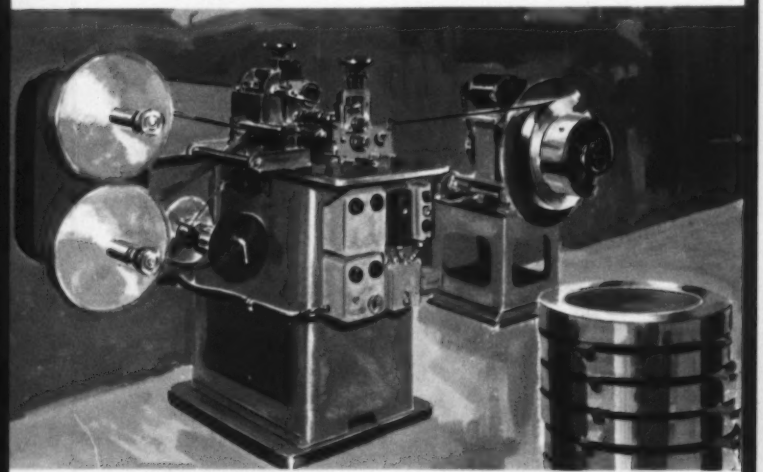
12½" SENDZIMIR MILL • Our 12½ inch "Z" mill rolls all metals to thicknesses as thin as .0003".



INSPECTION • Inspection, both visual and beta gauge, with continuous recording guarantees close tolerance satisfaction.



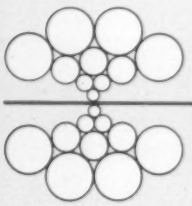
ACID CLEANING • The first continuous acid cleaning and pickling line of its kind in the country.



SLITTING • Precision slitting entirely separate from our facilities for standard production.

Reliable Rodney says:

"The first super-thin, extra wide (24") precision rolling of the following alloys was done right here at Rodney: high nickel, uranium, titanium, stainless, columbium. A combination of specialized equipment unequalled in the industry makes Rodney a tailor-made plant for conversion. We have these additional new facilities to give you the finest quality and service in processing super-thin, stainless steel and special alloys. Let us convert your metals and alloys to the exact specifications you require."



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HIGH SHEARING SPEED—Up to 18,000 cuts per 8 hour shift.

CLEAN, SQUARE CUTS—Shows up hidden defects.

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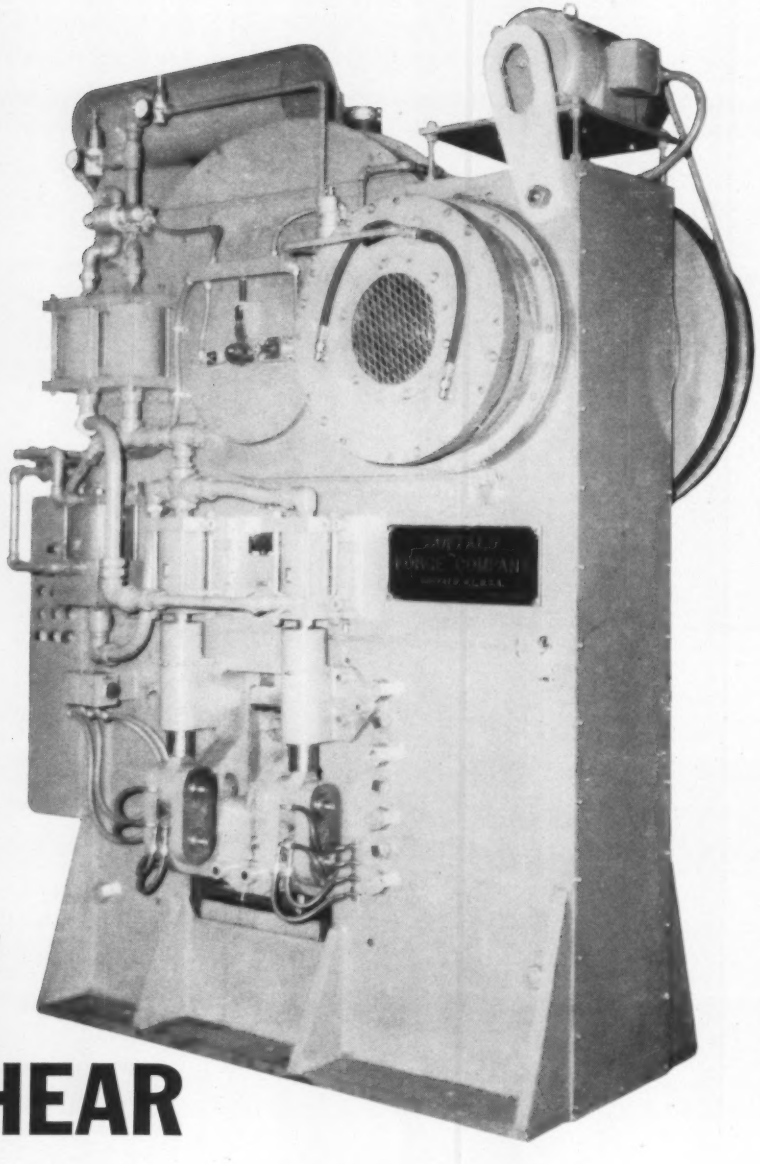

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Now—enjoy peak production on your billet cutting jobs. This new 'Buffalo' Billet Shear is ruggedly-built for maximum years of dependable, trouble-free performance. Greatest output at lowest cost is assured by efficient high speed operation. Clean, square cut billets permit high quality finished forgings. Features include alloy steel frame, electrical controls and pneumatic automatic oiling system.

For full details, including capacities available, contact your machine tool dealer or write us direct.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

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'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

ROEBLING WIRE, in Convenient Bulk, packaged to save you money, time and labor

If you use high-carbon wire in sizes from .060" diam. to .030" diam., it will pay you to investigate Roebling's Reel-less Core Packaging System. This method offers you substantial savings in several ways—to say nothing of the quality wire that Roebling always delivers in any kind of package.

Here's how simple it is:
Cores are palletized two cores per pallet and can be stacked two or three pallets high (think of the saving in storage space).

Empty reels are not accumulated because there are no reels to store, send back, bookkeep, get credit on, or pay shipping charges on (either way). Just unwrap the wire, set it up the way you see here, and there you are. Where a limited number of reel-less core packages are used, or where wire is flipped from reels mounted in a horizontal position, the tilt table is not necessary.

This method is typical, indeed, of Roebling's efforts to make quality easier to handle and to banish the problems that cost you time, money and sharp pains across the brow.

Full details of wire without reels will be immediately forthcoming when you write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

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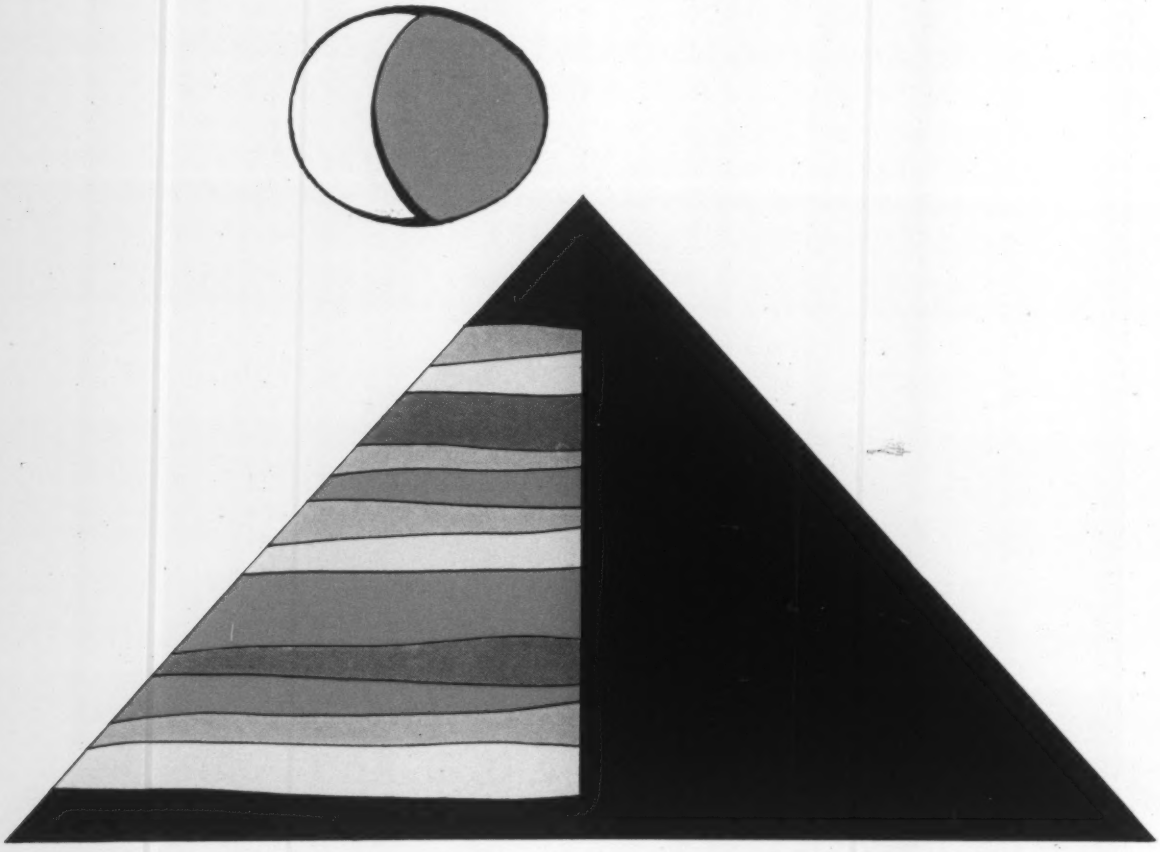
You'll put permanence into products with Western Brass because brass is tough to start with... because time, use and environmental attack only mellow it. But whether you use brass for strength or appeal, your product calls for an individual alloy, temper, gauge and finish. Count on Western Brass to recommend and produce exactly the right one. (It will even arrive in boxes specially adapted to your handling methods.) You'll make it better with durable brass. You'll make it best with "tailor-made" Western Brass.



OLIN MATHIESON • METALS DIVISION • EAST ALTON, ILL., NEW HAVEN, CONN.

Western® BRASS

In Steel—Alan Wood Prexy Sees No Price Hike

Harleston R. Wood, president, Alan Wood Steel Co., says present industry conditions will not permit a boost in steel prices to offset Dec. 1 wage hikes. He reports that Alan Wood customers have shown no indication of buying in anticipation of a price boost. He says customers seem to be waiting as long as possible before placing orders. "My guess is that it'll be several months before we get an upturn (in orders)," he says, adding, "On the other hand, I don't think it'll get appreciably worse."

Orders, Sales, Inventories Drop in October

U. S. manufacturers received new orders totaling $29.3 billion (seasonally adjusted) in October—down 4 per cent from September, the Commerce Department reports. Sales dropped $400 million to an adjusted $29.6 billion. Inventories fell $400 million to an adjusted $54.3 billion.

In Appliances—Westinghouse Exec Sees Upturn in '61

John W. Craig, vice president of Westinghouse Electric Corp. and general manager of the Major Appliance Div., predicts that appliance sales will begin to climb during the second half of 1961 and the upturn will continue through 1962. He says 1961 sales should be slightly higher than those of 1960—the fourth best year in the industry's history. He says replacements now represent 4 of 5 refrigerator sales, and that automatic washers will soon be replaced at a rate of 3 million a year.

U. S. Imports Fall More than Exports in September

U. S. imports in September totaled $1.16 billion—down $86 million from the August level—while September exports totaled $1.61 billion—down $2.6 million from the August mark, the Department of Commerce reports.

Industry Sales Reports Mixed

New orders for industrial heating equipment in October jumped 26 per cent above the September volume, but orders during the first ten months of '60 are down 19 per cent from those in the like '59 period . . . The National Welding Supply Association says members' third quarter sales rose 4 per cent above the level for the like '59 period . . . Comparing sales during 1960's first ten months with those of the like 1959 period, the Gas Appliance Manufacturers Association finds gas range sales are down 8.4 per cent, gas water heater sales are down 9.9 per cent . . . Vacuum cleaner sales

rose in September to the highest point since March . . . October sales by members of the National Industrial Distributors' Association rose 1.9 per cent above the September mark . . . September factory sales of transistors reached the highest monthly total of the year . . . The backlog of orders for freight cars rose in October for the first time this year.

In Construction—1961 Will Bring Dollar Record

Expect outlays for new construction to rise 4 per cent to a record dollar volume of $57.3 billion in 1961. The year will be only second best in physical volume, however, 2 per cent below the 1959 peak. So predicts the Business & Defense Services Administration. Outlays this year will be about $55.1 billion; the 1959 mark was $56.2 billion. By type of construction, here are the BDSA estimates (the first figure is the '61 dollar estimate in billions; second figure is percentage increase from 1960):

	Billions of Dollars	Increase
Total private	40.3	3%
Residential	22.6	3%
Industrial	3.1	7%
Commercial	4.2	2%
Other nonresidential	3.3	6%
Farm	1.3	0
Public utilities	5.5	4%

	Billions of Dollars	Increase
Total public	17.1	5%
Residential	0.8	7%
Educational	3.1	8%
Military	1.3	0
Highways	6.0	5%
Sewer and water	1.5	2%
Conservation and development	1.4	6%

In Shipping—Government Plans Aid

A "Ship American" policy is being drawn up by the Eisenhower administration. The goal is to retard the outflow of U. S. gold and dollars by channeling more of this country's exports and imports into merchant ships flying the U. S. flag.

In Sporting Goods—Look at the Boom

Metalworking firms dependent upon the sporting goods market can take heart from predictions made by L. T. Peifer, director of business development, Brunswick Corp. He estimates the number of U. S. participants in sports this way:

	1956 (In millions)	1965
Boating	28.0	40.0
Fishing	20.8	30.0
Bowling	20.1	35.0
Hunting	11.8	20.0
Basketball	11.0	18.0
Baseball	7.1	11.3
Softball	6.7	10.0

	1956 (In millions)	1965
Tennis	6.6	8.0
Golf	5.1	10.0
Archery	4.6	7.0
Skiing	2.2	4.0
Football	1.7	3.0
Track & Field	0.6	1.3
Wrestling	0.2	1.0

Eximbank Helps Argentina Buy U. S. Equipment

The Export-Import Bank of Washington has authorized a $10 million credit increase to the Industrial Bank of Argentina. That bank will, in turn, lend the money to Argentine firms to assist them in buying U. S. capital equipment. More than 90 per cent of the original $10 million loan—made last year—has already been committed.

How to Kill Gold Speculation

"The most obvious, immediately effective methods to kill antidollar gold speculation and hot money interest arbitrage," says S. J. Rundt, consultant on international business, "are: 1. To announce that we (the U. S. government) are now officially intervening in the free market, and to play that market in a manner where speculators are first goaded, then slapped down, with initial losses of the intervenor promptly recouped. 2. To abandon our easy money policy . . . to obviate the differential between our interest rates and those of Europe." Mr. Rundt points out that playing the market is the "standard weapon" of European central banks who are "a good deal more experienced than we are in coping with external deficits, currency weakness, and devaluation perils."

How Philadelphia Executives See Next Six Months

A survey of Philadelphia area executives by the Federal Reserve Bank of Philadelphia finds: Manufacturers hesitatingly predict a drop in capital outlays next year. They do not intend to build up inventories during '61, but they anticipate some increases in production. Here's the consensus on production as a percentage of capacity by quarters . . .

	1960		1961	
	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr
All manufacturing	78.0	78.9	79.5	80.4
Durable goods	72.9	74.4	75.3	76.6
Primary metals	61.1	75.9	78.4	79.0
Fabricated metal products	66.5	64.7	67.6	71.6
Machinery, except electrical	79.9	77.3	77.8	78.3
Electrical machinery	82.4	83.7	84.3	85.1
Transportation equipment	47.1	42.8	41.5	41.6
Instruments, related products	77.6	82.0	80.7	81.6

Weak Loan Demand Worries Economists

Economists are alarmed by the weakness in loan demand at the nation's commercial banks. At the end of October, business loans were down $210 million from the midyear level. Most of the drop has come in metalworking, where loan volume is $609 million below the midyear point. Loans to public utilities and transportation have dropped $133 million. The drop is partially due to a more conservative inventory policy, but most economists think it reflects more than that. Says one: "Let's face it. We're in a recession."

Ohio Is Coal Laden

Ninety per cent of an original 46-billion-ton coal reserve remains beneath Ohio's soil. That's the finding of a new study by R. A. Brant and R. M. DeLong of Ohio's Department of Natural Resources. They say half of the remaining 42 billion tons is recoverable.

Can Oil Pipelines Do Double Duty?

Scientists at the Research Council of Alberta (Canada) are conducting experiments aimed at finding ways to transport items like coal, petrochemicals,

and manufactured products via oil pipelines. One proposal is to use "torpedoes" that would be carried along by the fluid moving in the pipe. The product to be shipped would be packed into the torpedo (a capsule about 7 ft long) and carried—at about 10 mph—through the pipeline.

Corporations Boost Aid to Education

Educational institutions have been getting an increasingly larger share of the corporate gift dollar, a new report by the Council for Financial Aid to Education, New York, indicates. In 1947-48, corporate giving totaled $241 million with education getting about 10 per cent. By 1953-54, total giving had reached $494 million, of which education got 20 per cent. During 1959-60, corporate giving jumped to an estimated $530 million, of which education got 28.4 per cent.

Bachelor Degrees Up in 1958-59

The Office of Education has finally released an "advance report" on earned degrees in 1958-59:

	1958-59	1957-58		1958-59	1957-58
All fields	385,151	365,748	Astronomy	28	25
Engineering	38,134	35,332	Chemistry	7,308	7,010
Physical sciences	15,460	14,352	Meteorology	173	153
Psychology	7,383	6,930	Physics	3,809	3,186
Mathematics	9,019	6,924	Earth sciences	2,945	2,891

Straws in the Wind

New business incorporations dropped in October for the second consecutive month; at 13,760, the total was the lowest for any month since November, 1959, Dun & Bradstreet Inc. reports . . . Railroad outlays for equipment, roadway, and structures next year will decline to $850 million from the $952 million expected to be spent this year, executives at a Railway Progress Institute Conference report . . . The Justice Department has again urged the U. S. Supreme Court to order Du Pont to divest its 63 million shares of General Motors stock . . . Philco Corp. will test market its British-made radios and phonographs in the U. S.; the firm also will unveil a coin-operated dry cleaning machine early in 1961.

Metalworking Pulse

The Business Trend: The Thanksgiving holiday cut STEEL's industrial production index 12 points, more than in most years but equal to the holiday decline in 1957. Most of the loss should be regained by the week ended Dec. 3. **Autos:** Near record sales of new cars are keeping production schedules high. Output last month was near 600,000 units. December will be down but not as drastically as feared. **Steel:** Postholiday recovery was slower than expected.

- **INDUSTRIAL PRODUCTION**
  - Week ended Nov. 26 . . . . 139†
  - Year ago 158
  - Details on Page 79
- **PASSENGER CAR PRODUCTION**
  - Week ended Dec. 3 . . 145,000*
  - Year ago 55,337
  - Details on Page 75
- **INGOT PRODUCTION RATE**
  - Week ended Dec. 4 . . . 49.3%†
  - Week ago 48.0%
  - Details on Page 138

†Preliminary. *Estimated.

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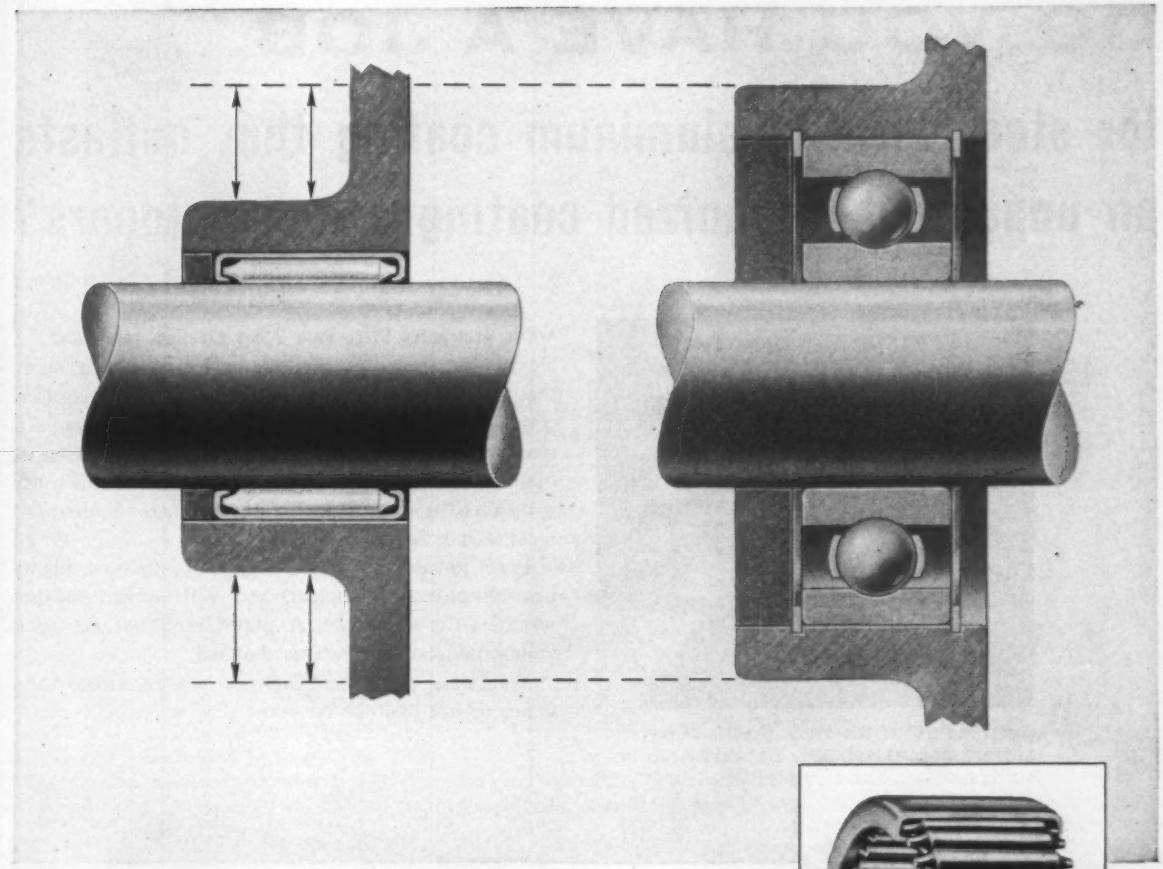
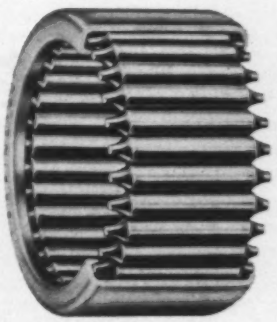


Designed for Compactness... Torrington Needle Bearings

Simpler, more compact design is possible wherever Torrington Needle Bearings are put to work in eliminating friction problems.

These outstanding bearings offer a higher radial load capacity than any other bearing of comparable size. They are more compact, lighter in weight, and are lower in unit cost. The full complement of small-diameter precision rollers insures exceptional antifriction performance and long, maintenance-free service life. The turned-in lips on the outer shell guarantee positive roller retention. Installation and assembly are fast, simple, economical.

The unmatched design and production advantages of Torrington Needle Bearings have been proved in applications ranging from office machines to automobiles, washing machines to earth-moving machinery. Give *your* product the benefit of our antifriction know-how. Write or call Torrington—maker of every basic type of antifriction bearing.



TORRINGTON NEEDLE BEARINGS FEATURE:

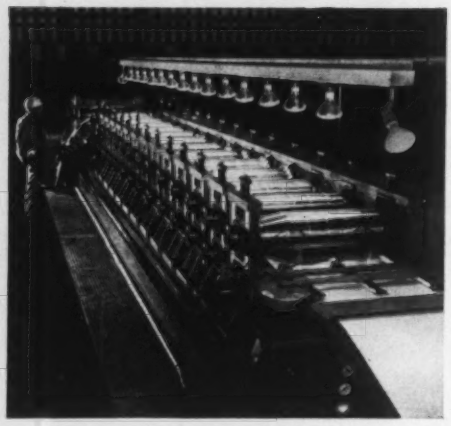
- Full complement of retained rollers
- Unequalled radial load capacity
- Low coefficient of starting and running friction
- Low unit cost
- Long service life
- Compactness and light weight
- Run directly on hardened shafts
- Permit use of larger and stiffer shafts

progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY Torrington, Conn. • South Bend 21, Indiana

DO YOU HAVE A JOB...

for steel with an aluminum coating that outlasts an unpainted galvanized coating 4 to 1 outdoors?



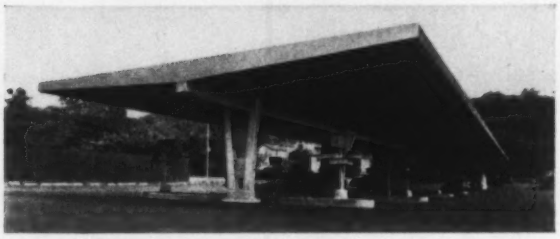
Sheets and coils of this special steel, in an assortment of gages and sizes, are workable by standard methods. Here, ALUMINIZED STEEL Type 2 is being roll-formed.

Sell with this symbol of modern, dependable Steel

Armco ALUMINIZED STEEL Type 2 has excellent references. Twenty-one years of outdoor corrosion testing show that its two-side hot-dip aluminum coating outlasts a commercial-weight zinc coating on unpainted galvanized steel sheets 4 to 1. Years of outstanding performance in buildings, rolling doors, awnings, ductwork, and other products in atmospheric service are additional recommendations.

Put it to work *now*. Steel-strong, fire-resistant, highly heat-reflective, economical, and with a surface that weathers like aluminum, ALUMINIZED STEEL can pack your products with features that sell.

Want more references? Call your nearest Armco Sales Office or just mail the coupon.



Sleek, durable canopies are made of Armco ALUMINIZED STEEL Type 2.

Durable ductwork of ALUMINIZED STEEL.

New steels are born at Armco

ARMCO DIVISION • Armco Steel Corporation
3070 Curtis Street, Middletown, Ohio

PLEASE SEND your catalog, **Armco ALUMINIZED STEEL Type 2**

NAME_____ TITLE_____

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ARMCO STEEL

ARMCO

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

December 5, 1960

The editorial below originally appeared on this page July 15, 1957. Many readers have suggested it is even more timely now. At their request it is reproduced.

Parable of the Prices

And it came to pass in the year of our Lord, nineteen hundred and fifty seven, that there was plenty in the land.

Yet with all this plenty, there were some who were sorely troubled.

And a soothsayer came among them, and they cried out unto him their woes:

We payeth more in wages to our labourers.

We payeth more for materials to our suppliers.

Our profit shrinketh.

Competition in the market place is keen, and we fear to raise our prices so as to recover our costs.

And now there cometh from Washington a politician, and he panteth after political hay as the hart panteth after the water brooks. And he uttereth loud noises against price increases.

Verily, what are we to do?

And the soothsayer spake unto them, and he talketh turkey:

Ye are beset by fears. I say unto you, fear not.

The need and the want for thy goods are great. Ye can sell plenty. Thy profits shalt not perish. For without earnings thou canst not provide the goods thy neighbors need. Thou canst not bring new products into the market place. Thou canst not grow and flourish.

Now I say unto you, first make thy costs competitive. Thy knowledge and thy skill, thy tools and thine inventiveness, they will help you.

And then I say unto you, when ye goeth into the market place, sell not first with price. Sell first with quality and service and engineering. Thy competitor, let him worry about prices.

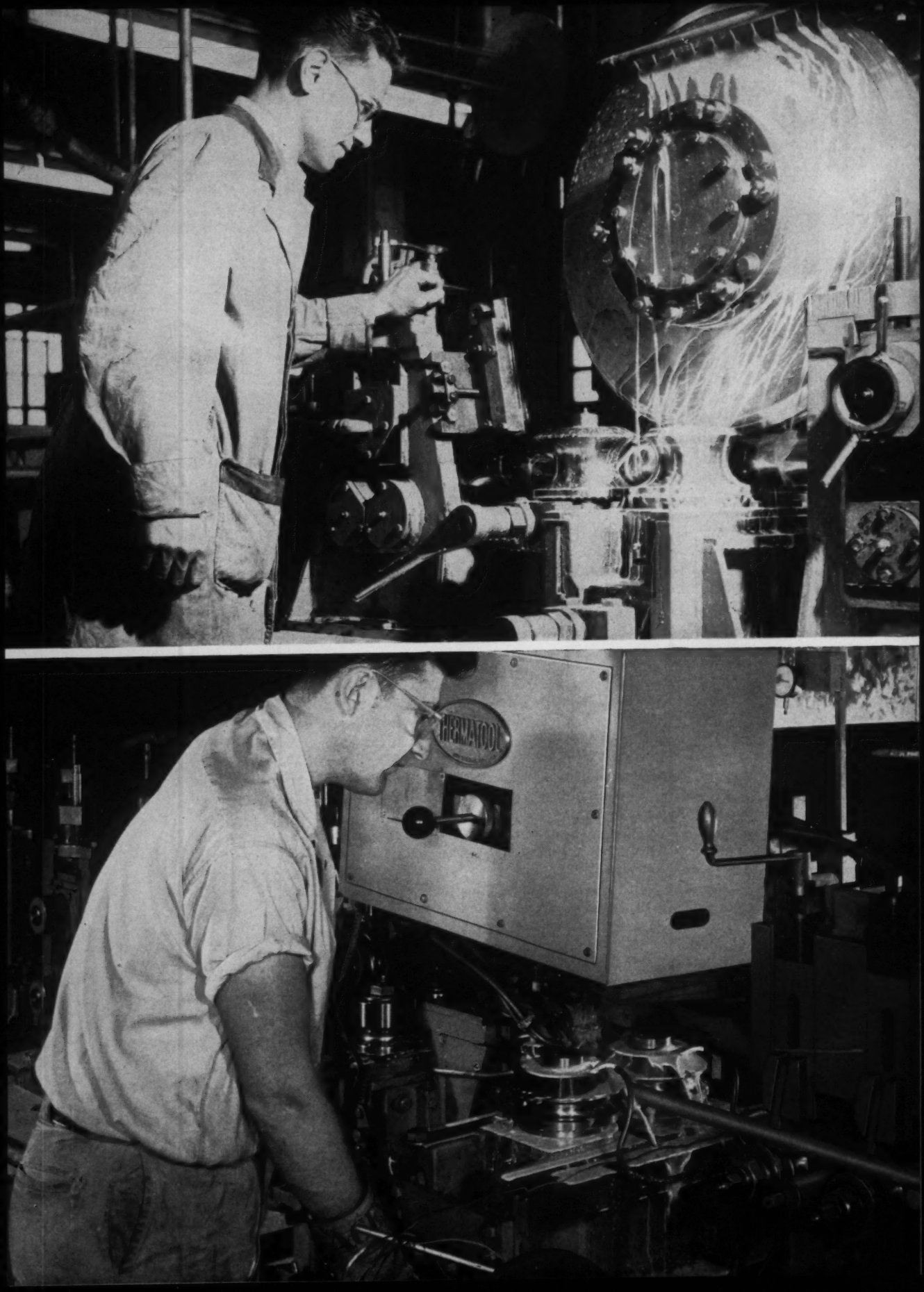
For it is written in the book that few buyers are lost because of prices. It is written also that lack of diligence among venders and unadjusted grievances do cause the loss of customers far more than doth price. And this is true ten times over.

It is written that the seller shall set the price for his goods. And this is an old law and a good law.

So I say unto you, go ye forth and set prices that will return ye a profit that is fair but not exorbitant. And go forth and worketh to beat hell. And ye shall rejoice in your plenty, and thy neighbors shall rejoice with you.

Walter J. Campbell

EDITOR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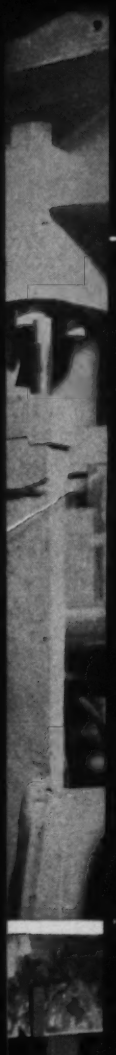


A CASE IN POINT

Why users prefer McKay Custom Engineered Tube and Pipe Mills

TOP PHOTO: A 150 KVA McKay Electric Resistance Welding Unit, part of a McKay series 500 Tube Mill at the Canadian Acme Screw & Gear Co., Ltd., Toronto, Canada.

BOTTOM PHOTO: A 450 Kc Thermatool* Welding Unit, installed in a McKay series 400 Tube Mill in the Delair, New Jersey, plant of The Wheatland Tube Co.

Each McKay tube or pipe mill is designed to provide you with maximum production output at minimum production cost, high quality product, and trouble-free operation. Care is taken to design each component in a tube mill to attain these ends, using the best designs McKay engineers have to offer and the cream of the available ideas of others.

For example, in addition to our own McKay* welding system, McKay offers the amazing new Thermatool® tube welding process for welding both ferrous and non-ferrous tubing and pipe of any diameter. We feel that you deserve the best, since you've learned to expect the best from McKay Machine.

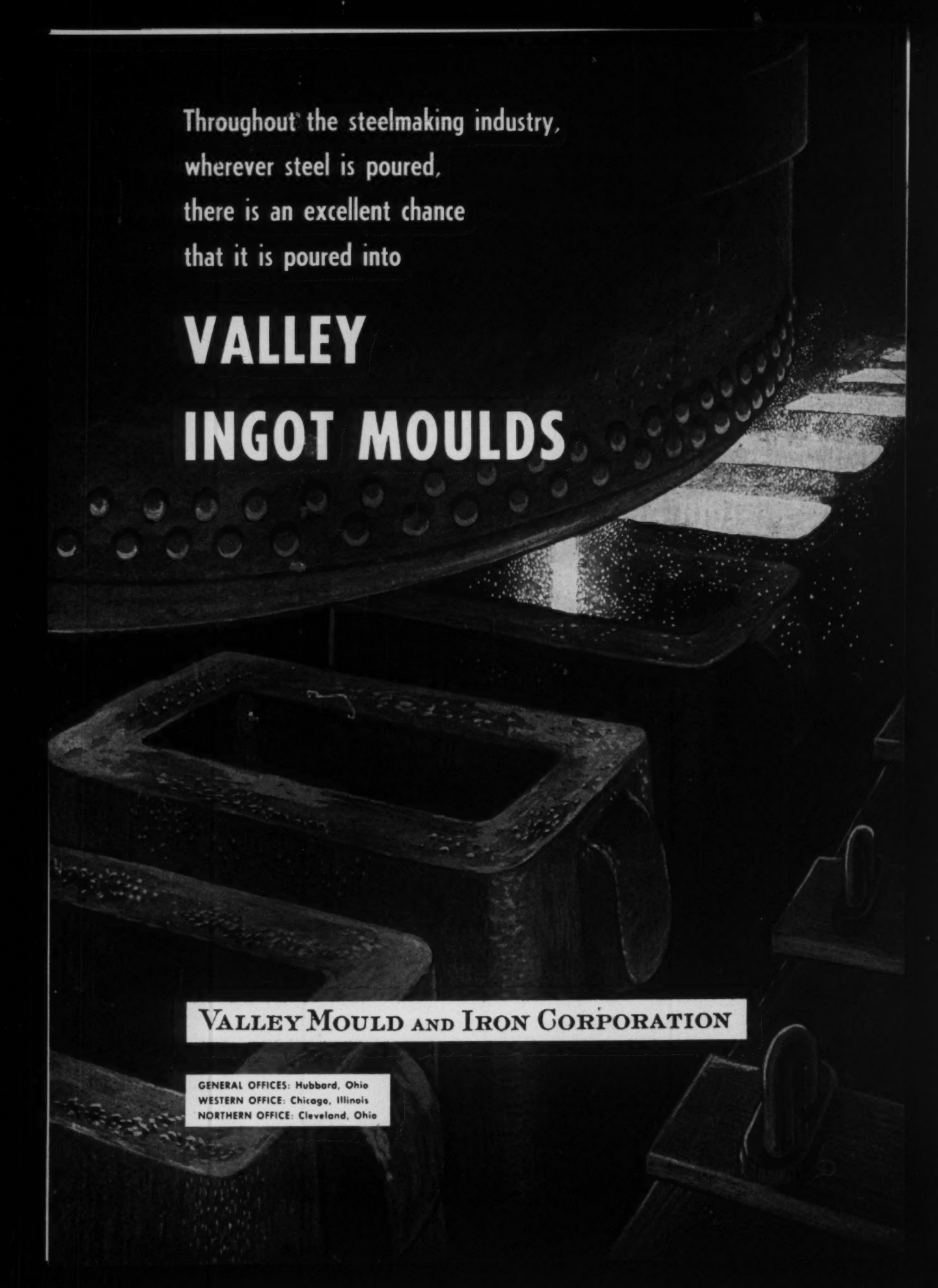
If it's custom engineered by McKay Machine, you can be sure it's designed to exactly fit your specifications, present and future. Before you invest in another tube mill, let us put you in touch with the McKay user nearest you. For if you take the time to compare, you'll find you profit most with a customer engineered tube mill by *The McKay Machine Company, Youngstown 1, Ohio.* *T.M.

®"*Thermatool*" *is a registered trademark of the New Rochelle Thermatool Corporation, New Rochelle, New York, and is used with their permission.*

LOOK TO

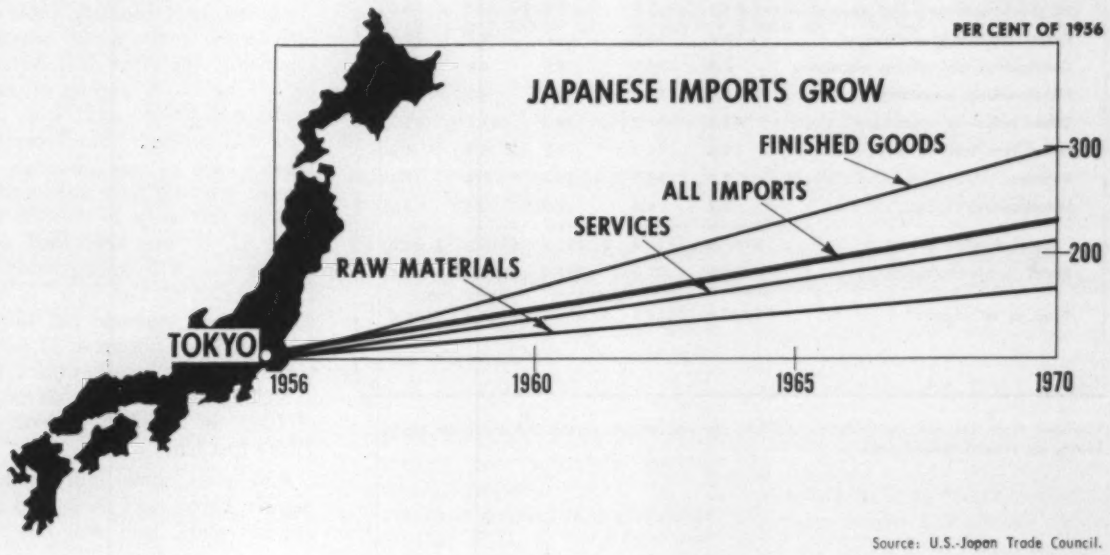
McKAY McK MACHINE

FOR PROGRESS IN METAL PROCESSING


Throughout the steelmaking industry,
wherever steel is poured,
there is an excellent chance
that it is poured into
VALLEY
INGOT MOULDS
VALLEY MOULD AND IRON CORPORATION
GENERAL OFFICES: Hubbard, Ohio
WESTERN OFFICE: Chicago, Illinois
NORTHERN OFFICE: Cleveland, Ohio

FOREIGN ROUNDUP

JAPAN



Source: U.S.-Japan Trade Council.

Japan: Good Market to Get Better

U. S.-JAPANESE trade relations provide both pain and relief to U. S. industry. The pain: Some segments of our industry face the prospect of stiffer competition from Japanese goods. The relief: Japan continues to be this country's second best customer. (Canada is first.)

Japan (population: 91.8 million) provides a $1 billion a year market for the U. S. And an additional $1 billion annually for our goods and services can be expected by the end of the decade, says Nelson A. Stitt, director of the U. S.-Japan Trade Council, Washington.

• **Why the Optimism?**—The Japanese economy is expanding rapidly. Gross national product was $22.6 billion in 1955. It is expected to reach $36.6 billion this year for a per capita jump from $254 to $368. Indications are that the expansion goal of 6.5 per cent a year through 1962 will be met.

The Japanese economy must rely heavily on imports to sustain growth, emphasizes Mr. Stitt. To provide the goods for economic expansion, imports should increase by 5.6 per cent annually, Mr. Stitt calculates.

Statistics for the first half, 1960, seem to bear that out. While Japan's exports reached a record $1,842 million, imports rose to $2,243 million, a 29 per cent increase over the like period of 1959. That's only slightly lower than the record for January-July, 1957, when speculative factors resulting from the Suez crisis contributed to a large import surge.

In October, Japan continued a trend toward removing import restrictions by lifting barriers against 257 more products, including 77 iron and steel products and 36 "daily necessities" and sundry goods such as kitchen utensils, heating apparatus, and plumbing fixtures. By the end of this month, all remaining discriminatory trade controls from the dollar area will be lifted. The procedure for obtaining foreign exchange has also been liberalized.

• **Competition Sharp**—"The U. S. will not automatically retain its one-third share of the Japanese mar-

This is the first of a three-part series in STEEL's *annual foreign markets roundup. Next week—Europe: Stepped Up Competition for Sales.*

U. S. Metalworking Exports to Japan

(In millions of dollars)

	1959	1958	1957	1956	1955
Iron and steel mill products	$ 9.5	$ 12.1	$ 50.9	$ 21.1	$ 6.1
Metal manufactures	4.9	7.5	7.8	7.6	4.4
Electrical machinery and apparatus	23.2	22.3	12.9	15.9	10.0
Power generating machinery	10.9	20.7	14.7	8.2	14.6
Construction and mining machinery	7.6	10.1	9.9	4.6	3.9
Metalworking machinery	34.6	58.3	43.6	6.5	6.1
Other industrial machinery	43.2	51.2	53.2	31.7	22.9
Office machines	19.6	11.3	11.7	8.9	4.8
Vehicles	8.4	19.7	15.3	7.4	7.3
Miscellaneous	5.7	4.6	6.7	3.6	2.9
Total durable goods	$167.6	$217.8	$ 226.7	$115.5	$ 83.0
Metal semimanufactures	125.9	31.3	259.9	173.7	32.2
Total of all exports*	$930.5	$829.5	$1,226.6	$887.3	$642.0

*Including foods and feed, raw materials and fuel, semimanufactures, durable and nondurable goods.
Source: U. S.-Japan Trade Council.

ket," warns Mr. Stitt, "for competition will be keen. However, Japanese demand will increase most in commodity groups in which the U. S. export position will probably be strong."

Projections show U. S. exports of machinery to Japan will climb from an annual average of $200 million in 1956-59 to $575 million by 1970. Exports of services will rise from the 1956-59 average of $275 million a year to $530 million annually in the ten year period. Sizable service items: Japanese payment for U. S. management, knowhow, and investment.

• **Total Exports Up**—Total U. S. exports to Japan are estimated at $1,250 million for 1960 compared with $931 million in 1959 and $642 million in 1955. In the first half of this year, our exports were $88.5 million more than imports.

Historically, most of Japan's purchases from the U. S. have been raw materials, fuel, food, and feed. In 1955, they accounted for 70 per cent of the total. Although raw materials and fuel exports will take 38 per cent of U. S. shipments this year, food and feed will take a smaller share (13 per cent). The big gainers: Semimanufactures, durable, and nondurable goods. Those exports have more than doubled in the last five years.

• **Metalworking Mixed** — While some segments of metalworking are not now sharing the success predicted by Mr. Stitt, imports from the U. S. in most groups were up in the first half of 1960 over the comparable period of 1959. Last year, imports of most U. S. metalworking goods were down from 1957, which was a period of abnormal growth and investment. Yet they were well above 1955 (see table).

In the 1957-59 period, the U. S. supplied Japan with 58 per cent of her imported manufactures. West Germany, which supplied 11 per cent, was second.

• **Japan's Steel Boom** — Japanese steel ingot production has been estimated at 22.2 million tons for the current fiscal year. Domestic steel demand has been revised 540,000 tons upward to 15.4 million tons for the fiscal year, a 20 per cent boost over fiscal 1959. The auto industry has shown the biggest increase, 40.1 per cent.

The Japan Iron & Steel Federation estimates exports of steel goods will reach 2.4 million tons for the fiscal year. Almost 90 per cent of that figure has already been contracted.

As the steel industry, now the fifth largest in the world, continues expanding, the effect will certainly be felt by U. S. exports of metal semimanufactures and iron and steel mill products. But because of Japan's lack of raw materials, increased demands have developed for iron ore and scrap. In the first half, 1960, U. S. iron and steel scrap exports rose $15 million over the same period of last year, to total $56 million. Japanese ore imports for 1961-62 are pegged at 17 million tons. U. S. ore exports were valued at $3.3 million in the first six months of 1960, an $803,000 increase over 1959's first half.

And even some mill products, namely silicon steel sheets and strip and tin plate, held well last year.

• **Nonferrous**—Japanese imports of U. S. aluminum scrap have shown an uptrend in the last five years. U. S. sales of copper base alloy scrap and metal, after falling off in 1958 and 1959, were up $12 million in the first half. And imports of all other metals and metal products rose $26 million over the same period of 1959.

• **Electronics**—Today, U. S. businessmen associate Japan with electronics goods more than any other product group. And Japanese electronics output estimates have been revised upward. Value of $1.8 billion by 1964 is now predicted, an 82 per cent jump over current levels. A sharp increase is expected in color TV receiver output, and a continued upward trend is seen for industrial electronic equipment, receiving tubes, transistors, and tape recorders and other acoustic apparatus. Transistor exports are slated for a 27 per cent increase in 1960, a boost of 10 per cent annually in 1961 and 1962, and a 5 per cent rise in 1963 and 1964.

That growth has been reflected in a $4 million decline in U. S. exports of electrical and power gen-

erating machinery to Japan in the first half. But based on 1959 trends, the greatest loss appears to be in power generating machinery. Between 1955 and last year, U. S. exports of electrical equipment and apparatus showed a continuing gradual upturn, with steam turbine-generator sets, electrical industrial furnaces, and radio and TV equipment leading the way.

• **Office Equipment** — Office, accounting, and computing machine sales to Japan increased substantially from 1955 to 1959 and are up $3.5 million in the first six months of 1960 compared with the like period of 1959. Bookkeeping and accounting machines, card punch machines and equipment, and electronic computers show strength in that category.

• **Machinery**—Despite a downturn in Japanese purchases of U. S. metalworking machinery in 1959, shipments in the first half of this year were up $354,000 over the first half of 1959. Boring, metal polishing, blast cleaning and tumbling, bending and roll forming machines, and forging hammers and machines showed an upsurge last year.

Sales of other U. S. industrial machinery are off the 1959 pace by $5 million, although still well above the 1956 mark. Power transmission systems have indicated a steady gain since 1955.

Vehicle exports dropped sharply in 1959. But when tractors, watercraft, and aircraft are included, sales were up $1.5 million over 1959's first half. Research and laboratory equipment have made steady gains in the last half decade.

• **Exports**—In the first half, Japanese exports of metals and metalworking goods to the U. S. were up in most categories. Notable exceptions: Vehicles, except agricultural, ferroalloys and similar metals.

Large gains were scored by steel mill products (up from $37.9 million to $53.1 million), radios and parts (up from $15.1 million to $27 million), and iron and steel manufactures (up from $14.6 million to $21.2 million).

The total value of Japanese goods brought into this country rose $105 million over the comparable period of 1959.

FOREIGN ROUNDUP
AUSTRALIA

Market Opportunities Up As Trade Barriers Go Down

THE FOLKS "down under" are on the way up. Australian gross national product rose from $11.95 billion in fiscal 1956 to $15.25 billion in fiscal 1960.

• **Imports Up** — Increased imports have been necessary to implement the upsurge in industrial development. Economists see this year's capital expenditures for manufacturing projects topping the $451 million record set last year. The United Kingdom, U. S., and West Germany are Australia's leading overseas suppliers.

Prospects for Australia increasing the value of U. S. purchases were brightened early this year when the Australian government eliminated quota restrictions on 90 per cent of imported products. Imports from the U. S. are expected to total $450 million this year. Between 50 and 60 per cent will consist of metals, metal manufactures, machinery, and vehicles.

Heavy industrial equipment, petroleum products, and chemicals are the leading imports demanded by the growing industrialization. While imports of materials and components for manufactures increased but 10 per cent from fiscal 1951 to fiscal 1959, much of the lethargy can be attributed to import barriers. Such imports for fiscal 1960 are estimated to be up 20 per cent over the previous year.

• **Growing Market** — Australia's population (now 10 million) is growing at a faster rate than that of the U. S. Personal income is topped only by the U. S. and Canada. Consumer spending jumped from $7.4 billion in fiscal 1956 to $9.5 billion in fiscal 1960.

U. S. investments, which are encouraged, are now valued at about $1 billion.

• **U. S. Opportunities**—Local production satisfies but 40 per cent of the lathe demand, 25 per cent of other machine tool needs, and only half of the metalworking machinery market.

The market for extra heavy and special excavating, earth moving, and construction equipment is good. Imports of internal combustion engines have been substantial, consisting of types and sizes not made locally.

The U. S. supplies 24 per cent of Australia's farm machinery imports, which have shown a gradual increase in the last decade. Haymaking and forage harvesting machinery lead the pack.

Imports supply about one-third of the Australian electric switch and control gear market. About 18 per cent of the electric motor imports come from the U. S. The motor market has generally declined since fiscal 1952's peak, but imports of fractional motors showed an upturn early this year.

Although imports of industrial mechanical handling equipment declined last year, Australian observers see increased opportunities for imported electric hoists, fork lift trucks over 10,000 lb capacity, mobile cranes, and conveying components such as belt idlers and idler rollers.

Sales of U. S. autos, new and used, are expected to rise. Trade barriers were eased in October.

• **Steel Imports**—The domestic steel industry (see STEEL, Oct. 3, p. 49), was unable to meet local demand in the last half of 1959. Result: Imports were up in the first half of 1960. Expansion projects are underway which will enable Australia to become a net exporter of steel by the mid-'60s.

Squeeze on Metalworking's Wholesale Prices

(1947-49=100)

	OCTOBER 1959	APRIL 1960	JULY 1960	OCTOBER 1960
Iron, steel	173.1	170.5	169.5	168.9
Nonferrous metals	137.2	140.5	138.6	137.1
Metal containers	152.9	154.8	153.6	153.6
Hardware	173.1	174.0	174.5	174.6
Plumbing fixtures	131.0	132.1	131.3	130.7
Heating equipment	121.5	120.1	118.7	119.3
Fabricated structural products	134.5	135.3	134.6	133.9
Fabricated products	146.7	146.1	146.0	146.2
Agricultural machinery	143.4	145.6	145.7	146.6
Construction machinery	172.5	174.7	175.5	177.0
Metalworking machinery	176.6	178.3	180.2	181.0
Electrical machinery	155.9	155.8	153.3	152.5
General purpose machinery	167.0	167.9	166.6	166.6
Motor vehicles	142.1	141.6	141.6	141.5
Miscellaneous machinery	149.7	150.1	150.1	150.4
Household appliances	103.9	103.1	101.7	100.9
Radio, TV, phonographs	92.1	91.7	91.4	91.1

Source: Bureau of Labor Statistics. October, 1960, figures are preliminary.

Metalworkers Wait for Steel Price Move

PRESSURE IS BUILDING in the metalworking industry to raise prices. The relief valve isn't likely to pop until the steel industry makes a price move.

Prospects for steel price hikes immediately are slim (see STEEL, Nov. 28, p. 141). Price increases, when they come, will be selective and keyed to demand.

Most of the price movement in the last year has been on the down side (see table). Reason: Competition. Almost without exception, the few increases have been in industries in which business conditions have been strongest, such as capital goods. In the meantime, costs have gone up, putting a tighter squeeze on profits. The big question now is: How long can metalworking resist the urge to hike asking prices?

• **False Alarm**—When the Bureau of Labor Statistics released its wholesale price index for October, it appeared at first glance that the upward break had come. The total index advanced from 119.2 to 119.7

(1947-49=100). It not only was the largest increase since September, 1959, but it also was the first time since 1956 that the index had risen in October. But the rise was almost entirely due to farm and food products and an unusual situation in the automotive industry. (Factory discounts to dealers on 1960 models cut the September price index but resulted in a strong rise when new models came out in October with prices comparable with those of a year ago.)

The BLS weekly reports for November indicate that the total index will hold at October's level, but that products other than farm and foods will dip, including metalworking.

• **Burden Increases**—But costs are continuing to climb, especially this month.

Two factors account for most of the increase:

1. The payroll hike in the steel industry became effective Dec. 1. Workers in 12 other industries already are assured under their labor contracts of pay raises ranging from 5.8 to 14.3 cents an hour next year.

2. The cost of living index jumped 0.4 per cent in October to an all-time high of 127. That means 1.1 million workers in auto, farm equipment, and aircraft industries will get wage increases. Like the consumer price index, wages and personal income are at an all-time high (see The Business Trend, Page 79).

• **Why Wait?**—But there is a hesitancy to raise prices throughout metalworking. In many cases, as in steel, demand probably would not support higher prices at this time. In others, management is holding off until it sees what the steelmakers do. Then there is always the threat of Congressional investigation if too many prices rise at once.

If demand is the key to the situation, price hikes are not likely to become the rule in the first half of 1961. There is nothing in the economic picture to indicate any appreciable climb in buying until at least midyear. Once steelmakers make a move on prices, you are likely to see a flurry of such activity as manufacturers attempt to recover some of their increased costs and beef up their profit margins.

Montana Steel Mill Moves Step Closer to Reality

THE STRATEGIC-UDY process for recovering iron, copper, and zinc from copper smelter slag has moved nearer to commercial realization. It was demonstrated on a pilot scale at the Niagara Falls, Ont., plant of Strategic Materials Corp. last week.

Webb & Knapp Strategic Corp. is developing the process for a 1000-ton-per-day steel plant it plans to build at Anaconda, Mont. (The proposal: Make steel from iron recovered from copper slag at Anaconda Co.'s smelter at that location.) Koppers Co., Pittsburgh, is engineering the plant and making economic and market studies. Webb & Knapp Strategic Corp. is owned by Webb & Knapp Inc., New York (85 per cent interest) and Strategic Materials Corp., Buffalo (15 per cent).

• **Power Vital**—The economic feasibility of the process is keyed to low cost electric power, says Frank Senior, general manager of the Niagara Falls plant. Last month, Webb & Knapp signed a contract with Bonneville Power Administration, for 120,000 kw of power, at a cost slightly under 2 mills per kilowatt hour.

Plans call for plant construction to start next May or June. Production is slated for July, 1963. About 25 per cent of the output has been contracted for, and negotiations underway involve another 50 per cent, the company reports.

• **What It Takes**—The Anaconda slag pile contains 33 to 37 per cent iron, 0.7 per cent copper, 2 per cent zinc, and traces of other metals. To make 1 ton of steel, it will take 5500 lb of slag, 4700 lb of limestone (nearest source is 12 miles away), 440 lb of pyrite (obtainable from Anaconda's tailing dumps), and 600 lb of coal. Other sources of carbon, such as lignite, can be substituted for the coal if necessary.

Basic steps in the process: A combination roasting and reduction in a kiln, feeding directly to an electric furnace where 91 per cent of the copper is removed as a copper matte; further reduction of the slag in a second electric furnace to produce a semisteel; and final refining and adjustment of analysis in a third furnace.

Other products, in addition to the ton of billet stock, include 5000 lb of "slag-slag," with possible uses in building materials; 25 lb of copper in the matte; 150 lb of zinc oxide; and 150 lb of sulfur, which may not be recovered. Power consumption is 3000 kwh.

Comments Sought On Renegotiation

METALWORKERS have until Dec. 15 to submit their comments on the Renegotiation Act to the Joint Internal Revenue Taxation Committee.

The Renegotiation Act calls for profits obtained on many government contracts to be reviewed for excesses — sometimes years after completion of the project. The committee is encouraging comments and will report to Congress by Mar. 31.

A committee staffman told STEEL public hearings are unlikely. The committee plans to call in interested groups for private hearings.

To those who want to write, the committee suggests: Introduce your letter with a summary of your recommendations, then discuss these areas:

1. Should the act be extended?

2. What has been your experience with the procedures, practices, and policies of the renegotiation board and other agencies involved?

3. Make suggestions for improvement, such as allowing exemptions of certain products, contracts or dollar amounts, or by improving accounting procedures.

Letters should go to: Colin F. Stam, committee staff chief, New House Office Bldg., Washington 25, D. C.

Space Age Casts Limelight on Beryllium

THE BERYLLIUM industry is riding a sales uptrend that started in 1954 (see chart).

For example, Brush Beryllium Co., Cleveland, expects to surpass its 1959 sales by about 50 per cent this year.

Beryllium Corp., Reading, Pa., looks for its profits to top 1959's record $1.5 million.

And the industry believes it will pick up added momentum via the space race—chiefly through the production of pure metal and beryllium oxide.

• **Space**—Lightness, strength, and heat resistance qualify beryllium as a space metal. Weighing two-thirds as much as aluminum, it has a strength-to-weight ratio greater than steel and a melting point of 2345° F.

Missile and aircraft builders are evaluating the metal for a wide variety of applications. For example, McDonnell Aircraft Corp., St. Louis, is testing a beryllium heat shield (built by Brush Beryllium) for its Mercury space capsule. Brush started with a hot pressed billet 58 in. in diameter by 8 in. thick to form a saucer 74 in. in diameter. (Aluminum Co. of America did the press work at its Cleveland plant.)

Other applications include: Precision airborne instruments, aircraft brake discs, jet engine control doors, jet engine parts, structural parts for planes and missiles, control surfaces.

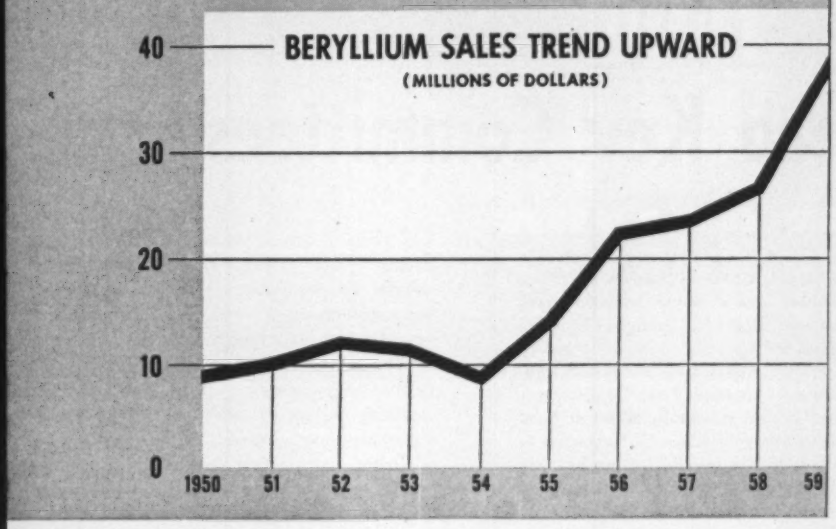
• **Atomic Power**—The metal's capacity to slow down and reflect neutrons makes it competitive with graphite, ordinary water, heavy water, even beryllium oxide. (Until 1958, beryllium metal was principally employed in atomic energy applications.) In reactors where the conservation of weight and space is significant, the metal's lightness has particular advantages.

English researchers are studying the use of beryllium clad fuel elements in gas cooled reactors for electric power generation.

• **Beryllium Oxide**—Nuclear and space applications of the oxide are growing. As a ceramic, it retains its structural integrity at high temperatures. It is similar to the metal in some nuclear characteristics and is an excellent moderator and reflector material.

The material's high thermal conductivity is boosting its popularity as a "heat sink" in electronics.

Other uses: Crucibles, refractory supports in electrical heaters, linings for coreless induction furnaces, and cathode heating elements in radio tubes.



Source: Brush Beryllium Co.

• **Beryllium Copper**—This alloy is still a dominant market for beryllium, but its expansion does not match that of beryllium metal and beryllium oxide, even though its sales continue to increase.

During World War II, about 90 per cent of the beryl available was committed to the production of beryllium copper. Today, alloying accounts for about 60 per cent of the beryl consumed in this country. By 1961 the figure should drop to about 50 per cent.

Principal uses: Springs, bellows, electrical contacts, aircraft engine parts, plastic molds, gears, bearings.

• **Price**—Beryl ore (about 4 per cent beryllium content) costs around $400 a ton. In November, simple, hot pressed blanks of beryllium metal were priced about $70 to $90 per pound, f.o.b. Cleveland and Reading, Pa. Beryllium copper master alloy was $43 per pound of contained beryllium, plus the market price of copper on the date of shipment.

• **Ore Sources**—The beryllium industry used about 8100 tons of beryl in 1959. Only 328 tons were mined in the U. S.

Some principal suppliers of beryl ore since 1936: Brazil, 36 per cent; Argentina, 14 per cent; Union of South Africa and South West Africa, 10 per cent; India, 10 per cent; U. S., 8 per cent.

Since the industry is so dependent upon beryl imports, the ore is on the government's list of strategic and critical materials for stockpiling. The General Services Administration has purchased domestically produced, hand cobbed beryl since 1952.

The program extends to June, 1962, or whenever the supply reaches 4500, short, dry tons.

• **The Hunt**—A beryllium rush is in progress. In Utah, 1000 mining claims have been filed in less than a year. Prospectors are searching from mid-Mexico to Canada. Studies indicate that ores containing beryllium oxide are usually found in mountainous regions. Beryllium Resources Inc. estimates that some claims in the Topaz Mountains, Utah, contain about 45 per cent recoverable beryllium oxide. (Beryl ore usually contains 11 to 12 per cent BeO.)

Other areas being probed include: South Dakota, Colorado, Nevada, and New Mexico.

• **New Contender**—A new firm, the General Astrometals Corp., Yonkers, N. Y., is scheduled to start operations shortly after the first of the year. The company plans to produce and sell beryllium products under license from Pechiney of France.

Molybdenum Deposit Found in New Mexico

A large molybdenite deposit, equivalent to an estimated 760 million lb of contained molybdenum, has been located on Molybdenum Corp. of America property near Questa, N. Mex., reports Marx Hirsch, president.

Designated as a strategic material for government stockpiling, the metal is becoming increasingly important to the nation's space, missile, and industrial programs. Free World consumption was 60 million lb in 1959. It is felt that consumption may increase to 80 million-100 million lb annually by 1975.

Currently, 90 per cent of the world's production is from the U. S. Half of that amount is generated as a byproduct of copper mining. (Such dependence can create supply problems because demand for copper fluctuates.)

Chief market: Molybdenum is used as an alloying agent that improves the properties of iron and steel alloys. The metal is also being used or considered for nozzles, re-entry cones, heat radiation shields, afterburners, and ramjet liners in missiles and aircrafts.

Other applications: Electronics, nuclear energy, and as an additive for oil and grease.

U. S. Goods Flow to Red Bloc at Eight-Year High

Export license applications to the Communist bloc tumbled to $19.5 million in the third quarter of 1960 compared with $35 million in the first quarter and $24.5 million in the second quarter, reports the Commerce Department.

Total applications granted in the first nine months were the highest in eight years—$79 million compared with $25.3 million in 1959.

• **Third Quarter**—Some of the commodities and countries for which grants totaling about $17 million were issued: Cold rolled steel sheets, industrial equipment, and tire fabric to Russia; transportation equipment to Hungary; cold rolled steel sheets, chemicals, and plastics to East Germany and Czechoslovakia.

They Will Head Key Committees

REP. WRIGHT PATMAN (D., Tex.), known as a fire eater, will most likely take over the Joint Economic Committee from Sen. Paul H. Douglas (D., Ill.) under the committee's rotating chairmanship principle. He is against the policies of the Federal Reserve Board because of freedom from Congressional supervision and a firm advocate of small business' role in the economy. He can be expected to start out agreeing with the administration but will end up in violent opposition to some of its policies.

REP. CHET HOLIFIELD (D., Calif.) is a good bet to be new chairman of the Joint Atomic Energy Committee. It rotates its chairmanship between a senator and representative. If Representative Holifield gets it, he will operate with a fairly free hand. He is in Europe now, working on studies concerning NATO (North Atlantic Treaty Organization) and U. S. co-operation on atomic energy. Early next session, need for better relations between Defense and the AEC will be studied.

SEN. CLINTON P. ANDERSON (D., N. Mex.) is expected by most observers to take over chairmanship of the Senate Interior & Insular Affairs Committee. With a fellow Democrat in the White House, he will push for a true long range minerals program. A forthright man who sets his own pace, he can be counted on to support increased tariffs on lead and zinc imports and increased subsidy programs for any minerals needing them. A conservative Senate will support him.

REP. ADAM POWELL (D., N. Y.), the volatile liberal, will occupy the chairman's seat in the House Education & Labor Committee. He will certainly strain the nerves of some metalworking executives to the breaking point. But chances are Representative Powell will be held down. The House is getting more conservative all the time, and it's reported that a working relationship between Republicans and conservative Democrats has been established for aid to education and labor battles.

CHANGES in Congressional committee chairmanships next year will create in some cases new working atmospheres in several areas important to metalworking.

At left, are four men and the committees they'll probably be heading when President-elect John Kennedy takes office in January.

Other committee chairmanships which will change include Senate Aeronautical & Space Sciences, Joint Defense Production, and Joint Internal Revenue Taxation.

Rep. Wilbur D. Mills (D., Ark.) is expected to take over the internal revenue group. The other two chairmanships are still in doubt.

Watch for almost immediate action from the man who takes over the space committee. Sen. Robert S. Kerr (D., Okla.) is a likely candidate with Sen. Stuart Symington (D., Mo.) next in line. The inability of the Mercury man-in-space program to get off the ground will be investigated early in the session.

• MORE ON SPACE PLANS — With the ever growing realization among congressmen that the Air Force is as deeply involved in space projects as the National Aeronautics & Space Administration, it's likely there'll be some squabbling over the new defense budget in January. Observers agree defense spending might rise $1 billion next year.

A few congressmen will demand to know why the Air Force is spending so much already and wants more when official U. S. policy calls for space activities to be basically civilian. Another point: NASA and the Air Force are duplicating each other to some extent. So why not recognize that space is a military matter basically and save some money? ask some legislators.

• CAPITOL NOTES — Hearings begin Wednesday (Dec. 7) on the state of the nation's economy. The Joint Economic Committee will provide a sounding board for Senator Kennedy's ideas to give the economy a quick shot in the arm.

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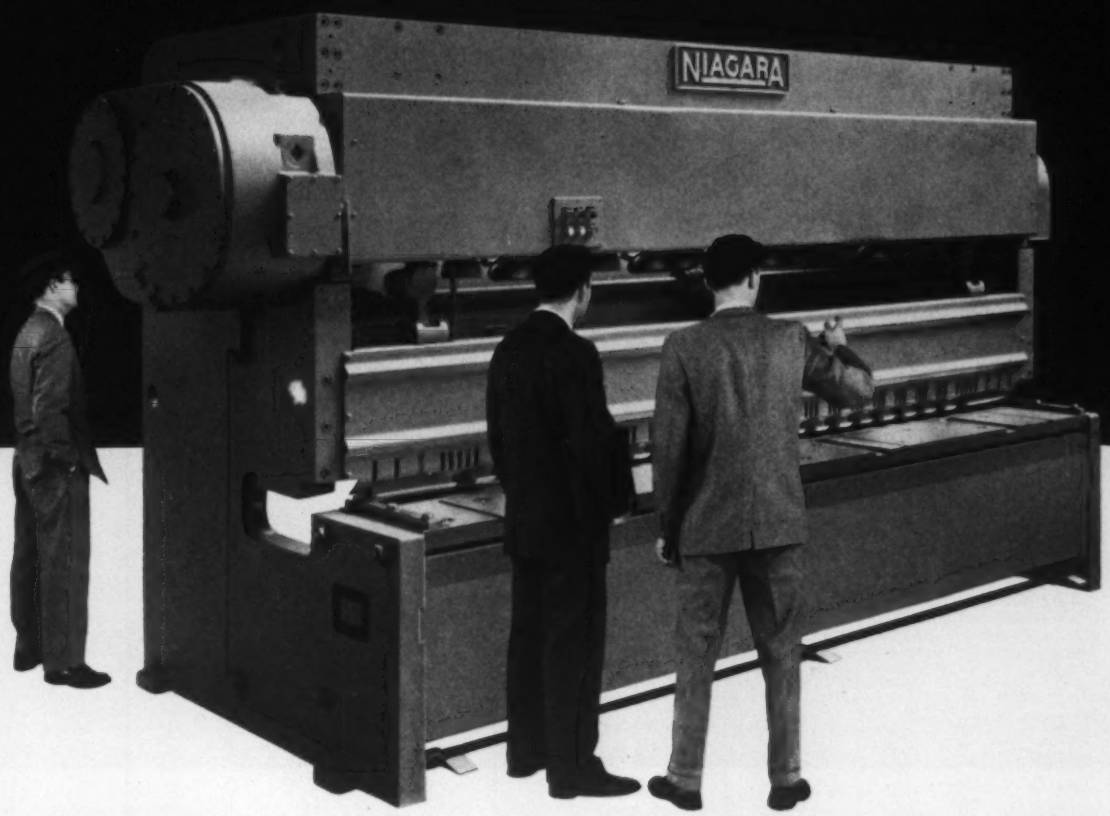

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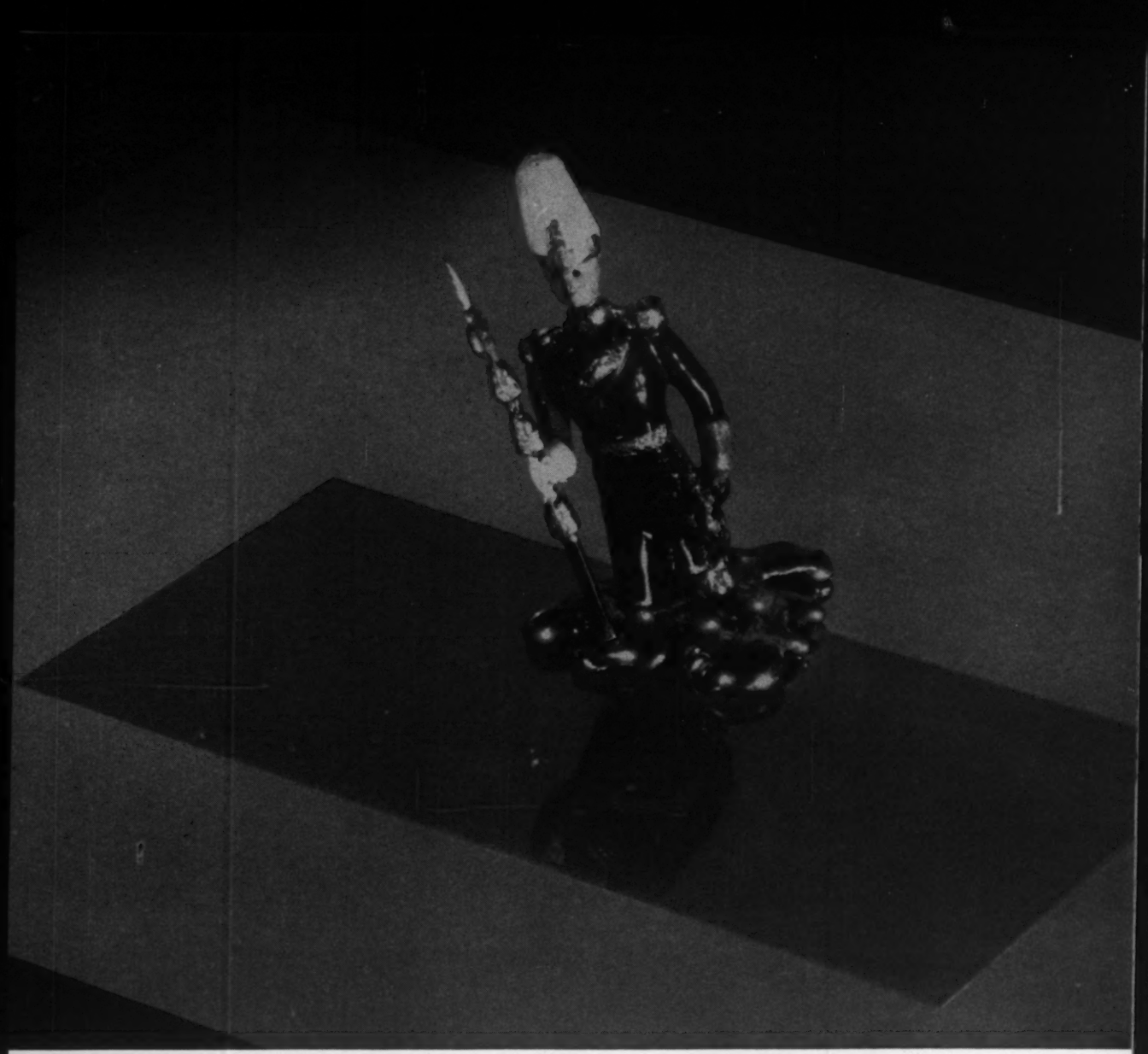

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GET MORE FOR LESS

NEGOTIATING SKILL is an important attribute for any executive. But it is a critical asset for the industrial buyer. His personal success—and the profitability of his company—depend, in large measure, upon his ability to get more for less.

Too many companies negotiate with suppliers on price alone. Many others hardly ever negotiate on anything.

● **When to Negotiate**—At an American Management Association seminar, John Howell, purchasing agent, Republic Aviation Corp., Farmingdale, N. Y., and Wilbur Pierce, supervisor-staff services, Detroit Edison Co., Detroit, listed 11 times when it pays to negotiate:

1. When there is only one satisfactory source for the item.
2. When you don't know how an item can be made.
3. When you want to develop a product never available before.
4. When you are doing follow-up procurement.
5. When the supplier was preselected for you.
6. When you plan to buy from a firm that was not the lowest in competitive bidding.
7. When you want a special procedure followed (additional inspection, for example).
8. When the market price is common knowledge.
9. When design changes are anticipated.
10. When engineering or tooling costs are high.
11. When extraordinary risk is involved (high dollar volume, long leadtime).

● **What to Negotiate**—Mr. Howell lists 11 negotiable items: 1. Price. 2. Delivery. 3. Manpower (including union problems). 4. Engineering services. 5. Quality control. 6. Design responsibilities. 7. Warranties. 8. Contract change procedures. (Object: So that when you want to make a change after the contract is let, you will evaluate only the worth of the change, not re-evaluate the whole contract—a practice many suppliers prefer.) 9. Percentage of price reduction that can be expected on any future business. 10. Revelation of the supplier's actual costs to the buyer. 11. Inspection. Other items are also negotiable. The examples simply illustrate the range of possibilities.

● **Why Negotiate?** — "Negotiation is a joint search for lower costs and better quality," explains J. F. Dailey, director of purchasing, National Tube Div., U. S. Steel Corp., Pittsburgh. He suggests:

When you ask for bids on a job, pick the two or three low bidders and check into their supervision, suppliers, equipment, labor contracts, inspection and quality control procedures, safety standards, and other salient factors. With that information, you can probably pick the best firm for the job.

In the negotiation, ask the supplier to break down the total cost into its elements. (It is usually done by showing the amount for

Industrial psychologist spells out . . . Seven Steps to Persuasion

● **The successful purchasing agent is a seller, not a buyer. He persuades the vender to see things his way. Dr. Mortimer R. Feinberg, New York psychological consultant and professor at City College of New York, outlined this approach at an American Management Association seminar . . .**

1. LISTEN TO THE VENDER.

Tell the vender how much time you have for him. Then listen to him. Get thoroughly involved. Organize your time.

2. LEARN ABOUT THE VENDER.

Find out what the supplier's representative is really interested in—his company, its problems; learn to know him as an individual. View your job as a human interaction.

3. SELL, DON'T DEBATE.

Tell the supplier why he should give you a certain price. Outline the negative briefly—to show that you recognize his side—then hit hard on the positive reasons why he can meet your price.

4. STAY IN CHARACTER.

Never identify the seller as a member of the opposition. Always talk to him as though he were on your side. Make achievement of your goals a co-operative venture.

5. AVOID EXAGGERATION.

Remember that you're striving for a continuing relationship. Don't exaggerate; it hurts credibility. Don't overcommit yourself. Never tell one vender how you "messed up" another vender. Don't overuse his fear of losing your business. If he's in danger of losing the account, tell him; but don't tell him that if it's not true.

6. SEEK AN INTEGRATED SOLUTION.

Try to arrive at a solution that meets the needs of your company and the vender's firm. That doesn't necessarily mean a compromise. Try to find a completely new avenue.

7. MAKE THE COMMITMENT PUBLIC.

When you win your point, get it on the record. Copy the girl who has just accepted a marriage proposal. She doesn't keep it a secret, giving the man a chance to back out gracefully. She announces it. The man no longer considers getting out of it.

materials, amount for labor, and amount for overhead.) A better procedure is to break the product into its components and determine the cost of each. Point out to the supplier that you don't want to take away his profits; you want to help him cut costs. You might assist him in his make-or-buy decisions, suggest more efficient methods of producing a component, suggest a more reliable subcontractor.

Find out how the supplier plans to make the item. He may have an ingenious approach that trims the cost far below your estimate.

In negotiating to buy a piece of capital equipment, suppose one brand offers a special feature. Put a dollar value on the feature and tell the supplier you'll pay him that premium. Tell the other bidders the value of that premium.

Mr. Dailey says it is advantageous to negotiate on items where the market price is common knowledge. Reason: To establish mutual, long term, confidence. The supplier then knows that he'll get part of your business if he trims his costs to the best possible figure. He'll learn your operations and be in a better position to help reduce the over-all cost of your product. "We feel we get better prices through negotiation than through competitive bidding," affirms Mr. Dailey.

Negotiators must remember, though, that many suppliers in industries where market price is common knowledge, resent the pressure placed upon them in negotiations. They claim that some big companies use tactics that fringe on be-

ing unethical. Mr. Dailey points out that, if you plan to negotiate after getting competitive bids, the suppliers should be told about the plan for negotiations before bids are submitted.

Always negotiate a job when there is a single supply source. Example: A major steel company wanted to buy a $2 million equipment line from what it calls "the only experienced builder in the field." During negotiations, the steelmaker learned that $600,000 worth of the cost was steel. The steelmaker furnished all the steel itself and saved $100,000.

Suppose you want to buy a production part that has never been mass produced. The easy way is to contract on a cost-plus basis. But that gives the seller no incentive to reduce costs. Mr. Dailey suggests that you clearly define the cost of each operation involved in making the item, then handle the balance of the cost on a fee basis.

Another good time to negotiate: Suppose you need replacement parts regularly and would like to get them locally, but the part is protected by patent. Try to negotiate for a patent release (on a royalty basis) and place the job with a local firm. (The procedure need not be confined to replacement parts.)

● **Learning Curves**—A prime rule of smart purchasing: Follow-up purchases should be made at a lower unit cost than the original purchase. Reason: The supplier should have learned, through experience, how to lower his production costs —and his marketing costs will be lower than they were on the original order.

The learning curve, widely used in military procurement, is a method of predicting the rate at which costs will decline. The theory says that each time you double the total quantity on order, the average number of hours required to produce the new total quantity is reduced by a constant percentage. What percentage? Mr. Howell gives this rule of thumb (for nonstandard parts):

- If the costs of the item you buy are 25 per cent machining, 75 per cent assembly, the learning curve is 80 per cent.
- If the costs are 50 per cent machining, 50 per cent assembly, the learning curve is 85 per cent.
- If the costs are 75 per cent machining, 25 per cent assembly, the learning curve is 90 per cent.

● **How to Use Them** — Suppose your first order was for 200 units, and it took 10 hours to produce each unit. That's a total of 2000 hours. Now you want to place an order

Top negotiator outlines . . . The Strategy of Winning

● **"Negotiation is the manipulation of people's minds," says Dwight Brooks, manager of subcontracts, Airi Div., Burroughs Corp., Paoli, Pa. He told participants in an American Management Association seminar to look upon negotiating as a contest in which one side wins at the expense of the other. To help you win, he offers these tips . . .**

PLAN

Anticipate the possible and probable happenings. Anticipate the strategy of the opposition. Decide what you will do in a given situation. Dry run the negotiating session. (Take a lesson from labor unions. The negotiating team rehearses against its own specialists.) Prepare an agenda carefully. Start with a statement of objectives, placed subtly in your favor. Break the problem into its logical parts and tackle one at a time.

SET THE TONE

Establish an atmosphere that creates confidence and compatibility. Seek to establish a common language; eliminate the oft-occurring problem of semantics. Maintain a sense of humor. Be patient. If necessary, simply out wait the opposition.

CREATE ATMOSPHERE OF ACCOMPLISHMENT

Take notes. Summarize, in writing, after each major point. Get agreement on it. Make the negotiating session a series of conferences—one on each major point.

BE ETHICAL

Stay within the bounds of legality. Never stoop to unethical means to reach your goal. Always consider the long term objectives of your company. And think of the effect that your agreement can have on the economy.

for 200 more units. Assuming a learning curve of 90 per cent, how many hours should it take to produce the new order? Multiply 90 per cent times 10 hours. The answer, 9 hours, is the average time required to produce each unit. That means it should take 3600 hours to produce the 400 units. You paid for 2000 hours in your original order. So you only have to pay for 1600 hours in the follow-up order. Mr. Howell says the use of learning curves has earned considerable acceptance in industry. But some suppliers object when they are applied to the fourth or fifth follow-up order. They say all the learning has been applied by that time.

Picking a Negotiator

At an AMA seminar, R. T. Stark, director of purchases, Burroughs Corp., Detroit, listed these requirements of a good negotiator: Administrative ability, initiative, emotional maturity, ability to understand and enjoy people, ability to communicate, knowledge, common sense, leadership, adaptability, self-confidence, and respectability.

Preparing Your Pitch

The good negotiator is a salesman, not a buyer. He sells his point of view to the vender. To do that, he must enter the negotiating session fully prepared. Burroughs' Dwight Brooks outlines a strategy on Page 71.

For more tips on how to prepare, listen to Gordon MacDonald, consultant-purchasing services, General Electric Co., New York. He says you should set up a time schedule for each step in the negotiating process. Supplement that with a work schedule—the knowledge needed at each step; pinpoint responsibility for gathering that knowledge. Some time must be provided for contingencies—but a schedule minimizes such happenings since the negotiation is thought through beforehand.

Two kinds of preparation are required for successful negotiations:

• **Internal** — This encompasses knowledge about your own firm. Ask such questions as: Is the job a new design? When was it last changed? Will it be changed again shortly? What are the design limitations? Also anticipate all areas in which you will need support (from engineers, legal, and financial men).

• **External** — You must have full knowledge in areas like these: The economic trend, the exclusiveness of the seller's position (patents, proprietary information, number of orders on books), the seller's sensitive areas (like pride in engineering talent), the labor position (When will his labor contract end? Is a wildcat strike likely?), past performance (for your firm, another firm). You should also have basic knowledge about the supplier's industry (Example: Is capital investment high?).

Pitfalls to Avoid

A buyer for a large multiplant firm with centralized purchasing negotiated a contract calling for separate billings for each delivery at each point of use. Result: Much costly, unnecessary paperwork.

In negotiating a large volume contract, another buyer failed to specify how the delivery was to be made. Result: The full order was delivered at one time; the firm did not have adequate storage; much direct cost was added.

To avoid such pitfalls, keep in mind these 14 warnings by C. F. Ogden, vice president, Detroit Edison Co.:

• Always question whether you should negotiate or just accept the lowest bid. Negotiation is expensive, takes a high degree of skill.

• Get all the facts before you start to negotiate. One buyer failed to check the vender's labor contract and his order was held up several months by a walkout.

• Be sure you have obtained proper legal information before you sign the negotiated contract.

• Be wary of prices that seem too good to be true. They usually are. Such a deal will probably do you little good, since the vender will try to overcome his error—or he may go broke.

• Be sure the supplier is financially responsible. If the firm is owned by one man, find out what would happen if he should die.

• Avoid, generally, specifying how the job is to be done. Be sure you do spell out the what. Telling how limits the vender's creativity—which can work for you.

• If price escalation is necessary, be sure the index used is acceptable to both parties, and that the conditions governing the index are beyond either party's control. You don't want to pay for inefficiency.

• Haste makes waste. Schedule all steps in the negotiation process—from the time you decide to start looking for a supplier through the delivery deadline.

• Consider restricting the vender's freedom in picking subcontractors. Be advised in advance of any subcontracts he plans to let.

• In any cost plus or fixed fee contract, carefully consider the definition of cost. Clearly state what the cost encompasses. Give the supplier an incentive to keep costs down.

• When you use "satisfactory performance," spell out what is meant. State the types of tests and inspections to be made.

• Put each point in writing as you agree upon it.

• Be wary of giving suppliers more information than is necessary to do the job. But don't build a barrier.

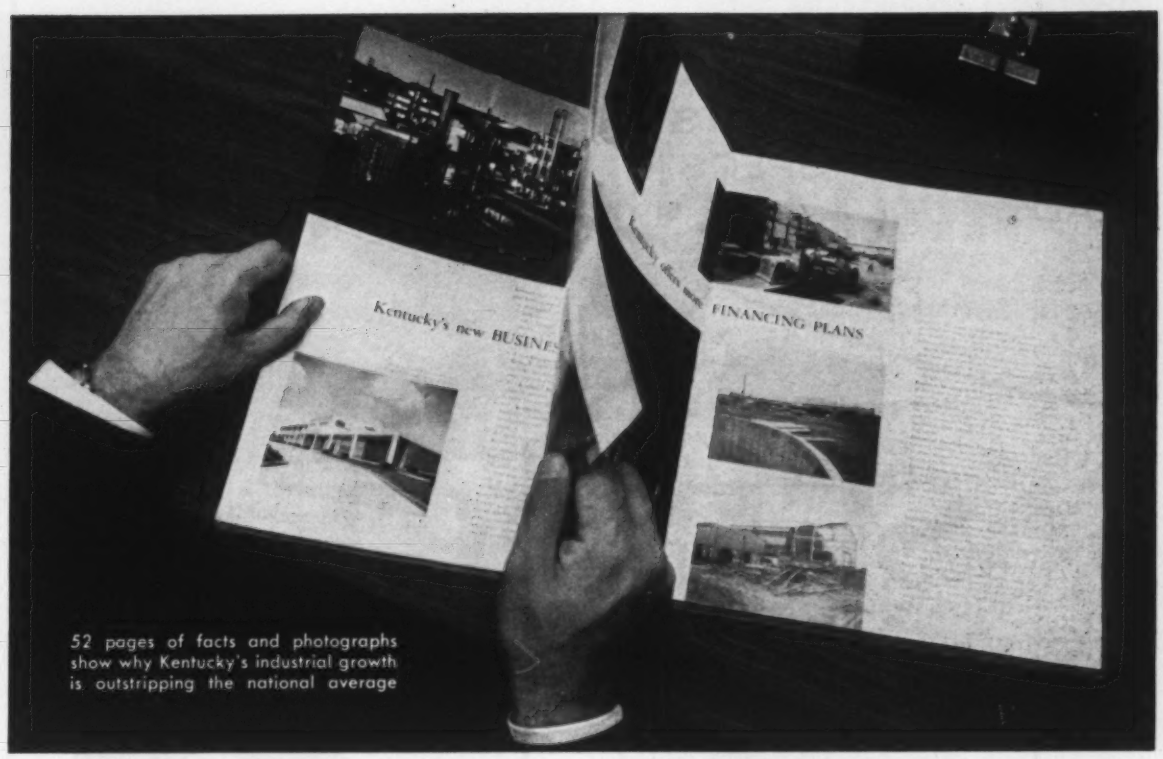
• When you don't know an answer, admit it. Bring in an expert.

• **Conclusion** — Negotiation is an exercise in persuasion. "It's the most advanced form of purchasing skill," says Mr. Pierce. The purpose of negotiations is to arrive at a mutually satisfactory agreement. Be sure the deal you make is good for you, the vender, both your industries, and the economy.

Materials Efficiency

Management Gets It

On Dec. 19, STEEL will conclude this Materials Efficiency series. For a free copy of any or all articles in this series (running every other week since July 4), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. By using material like this on the job, you may win $1000. For details, see Pages 5 and 6.



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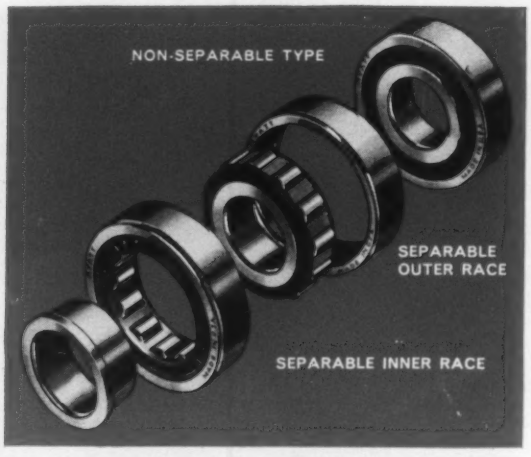

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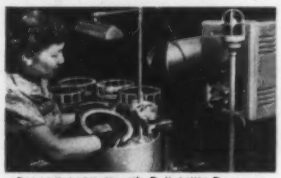

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Auto Sales Hold; So Does Production

AUTO SALES are better this quarter than carbuilders had anticipated. So production won't be cropped as closely as Detroit predicted a few weeks ago. The news is hopeful, but the fact remains: Current sales aren't a true measure of how the 1961s are doing. Almost 25 per cent of the October-December registrations are 1960 cars being cleaned out at discount prices under factory rebates. Most marketers expect a slump when the 1961s stand on their own next month.

Sales have been rising steadily since new car introductions. Preliminary figures indicate November sales will hit half a million units, which will be second only to 1955's record 530,000 deliveries in November. *Ward's Automotive Reports* says 1.6 million registrations are possible in the final three months of the year.

• **Output Holds** — Unless severe cutbacks are made in the next two weeks, December car production will top the 450,000 mark. Added to the 600,000 cars turned out last month and the 618,000 built in October, fourth quarter production will hit 1.7 million units. Automakers initially scheduled 1.9 million units for the period, but cutbacks in late October and early November led programers to talk about reducing fourth quarter output to 1.5 million cars or less. That won't happen now.

• **Inventories Climb** — Even the most optimistic forecasts show that sales can't exceed production in the last quarter, so there will be more cars in inventory come Jan. 1. A 1-million-car stockpile is expected. That level is no longer considered excessive, but it will place pressure on dealers whose pretax operating profits aren't expected to be better than the 1.4 per cent rate they had in the third quarter. First half profits averaged 1.7 per cent.

In addition to the steady sales rate, another reason is advanced for the strong production buildup: Automakers are anticipating a series of price increases in steel and other materials in the first quarter of 1961. Purchasing programs indicate slightly reduced buying for the next two months, although one purchasing agent told STEEL that plans could be changed quickly if builders get definite word about steel pricing intentions.

• **Reaches Record**—When the 6 million mark was passed last week, 1960 became one of the four best sales years on record. The other over-6-million years are 1950, 1955, and 1959. Imports played a half million unit role in 1959 and 1960. They were almost nonexistent in 1950 and 1955.

It's interesting to see how key market areas are faring. In the economy car race, Falcon and Comet are accounting for 29.3 per cent of the lower priced vehicles. Imports are taking 22.6 per cent, Rambler 21.2 per cent, Corvair 11.1 per cent, Valiant 10.1 per cent, and the Lark 5.7 per cent. The economy (compact) market will win almost 30 per cent of 1960 sales.

Station wagon sales are close to the 14.5 per cent penetration chalked up in 1959. Some 5 per cent are compacts. Here's the wagon breakdown by companies:

GM	33%
FMC	32
Chrysler	17
AMC	16
S-P	2

Another category, which Ford Motor Co. calls personal cars, is holding 2.4 per cent of 1960 sales. Included are the Thunderbird (51.5 per cent), Corvette (7.2 per cent), and imported sports cars (41.3 per cent). The figures are for the first eight months, but the percentages are expected to hold all year.

(*Please turn to Page 76*)

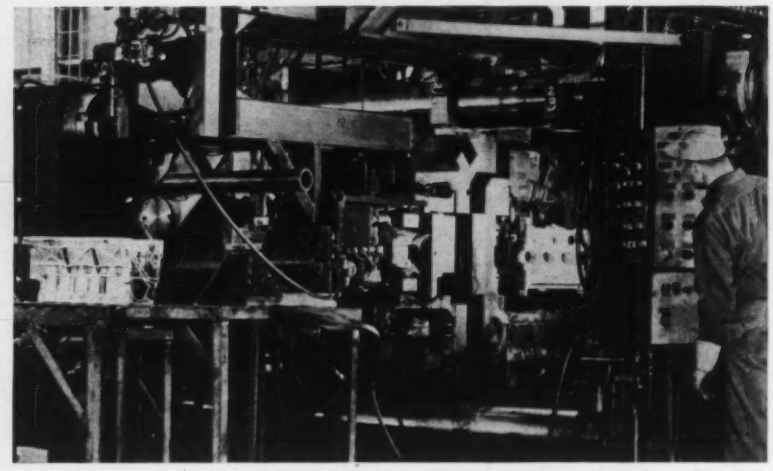
1961 Model Output

(Through Nov. 19)

	Units	% of total
Economy Cars		
Corvair	51,891	3.5
Tempest	13,436	0.9
F-85	26,050	1.7
Buick Special	23,897	1.6
Falcon	121,857	8.1
Comet	63,120	4.2
Valiant	49,216	3.3
Lancer	46,166	3.1
Lark	27,563	1.8
Rambler*	106,887	7.1
Total	530,083	35.3
Standard Cars		
Chevrolet	272,095	18.1
Ford	235,267	15.7
Plymouth	72,179	4.8
Total	579,541	38.6
Medium Cars		
Pontiac	71,415	4.8
Oldsmobile	69,112	4.6
Buick	56,391	3.8
Mercury	40,998	2.7
Dodge†	79,773	5.3
De Soto	2,774	0.2
Total	320,463	21.4
Upper Medium		
Chrysler	23,169	1.6
Thunderbird	7,564	0.5
Total	30,733	2.1
Luxury Cars		
Cadillac	30,130	2.0
Lincoln	2,207	0.2
Imperial	6,438	0.4
Total	38,775	2.6
GRAND TOTAL	1,499,595	100.0

Source: *Ward's Automotive Reports.*
*Includes Ambassadors and Classics.
†Includes Darts.

How AMC's Engine Blocks Are Diecast



DIECASTING the 67 lb aluminum blocks for American Motors Corp.'s six cylinder engine requires presses with 2000 tons of locking pressure. A battery of four machines casts 80 to 100 blocks an hour at National Lead Co.'s Doehler-Jarvis Div., Toledo, Ohio.

Elmer Bernitt, AMC's vice president, automotive operations, says his company started the aluminum block program with Doehler-Jarvis three years ago. The in-line engine is used only in Rambler Classic cars at present. Its use in other lines will be held up until the company perfects an aluminum head. The present head is sand cast from gray iron. Mr. Bernitt reports the aluminum block reduces front end weight 80 lb. The assembled engine weighs about half as much as its gray iron counterpart.

SAE 305 aluminum with a 12 per cent silicon content is used for the blocks. Molten metal is maintained at 1200 to 1250° F in 8000 lb holding furnaces behind each casting machine. The six, gray iron liners and two camshaft inserts are preheated to 600° F and placed in an automatic loading fixture which inserts them into the dies. Aluminum (about 70 lb) is shot into the die under 8000 psi pressure. It takes about 9 seconds for the shot to chill. An automatic extractor pulls the blocks from the mold. The gate is knocked off as the block is transferred to a roller conveyor; a core puller then pushes out the cylinder liner cores. Cores are returned to a preheater before reloading for another shot. Meanwhile, the dies are being water cooled, air blasted, and swabbed with a graphite-oil lubricant to ready them for another injection. The complete cycle takes about 3 minutes.

A fifth machine (with an automatic cleaning and lubricating device) will be put into operation this month. It's expected to cycle in half the time required by the other four.

Pilot Plant Considered For Management Training

STEEL sources report that 80 per cent of the top management personnel in one of GM's car divisions will be retiring over the next three years.

Most of the managers who will replace them have less than ten years' experience with the division —barely adequate by GM standards. So the division chief is toying with the idea of setting up a small assembly plant which will be used as a training ground for managers and union stewards. He has already approached the UAW on the subject.

The proposed plant would be expected to contribute its share of the division's annual car output. Among its labor personnel would be a smattering of troublemakers. Equipment would include obsolete and ultramodern machinery. Management and labor would be quickly exposed to the kinds of problems they'll later encounter in the division's main facilities.

If the plan works out, it will stand as a unique approach to meeting autodom's rapidly growing demand for experienced management. It also would be (for Detroit) a revolutionary approach to improving labor relations.

Harvester Plans Compact

International Harvester Co. will introduce a new, all purpose compact vehicle early in 1961, reports D. F. Kuntz, sales manager, Truck Div.

Named the Scout, the vehicle can be converted from a passenger runabout to a small pickup truck. Design features include pickup body, a detachable hardtop cab, and detachable doors. A four cylinder engine will be standard. Two or four wheel drive will be available.

U. S. Auto Output

Passenger Only	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816	507,527
10 Mo. Totals	5,574,983	4,844,252
November		254,527
December		494,931
Total		5,593,707

Week Ended	1960	1959
Oct. 29	150,019	101,616
Nov. 5	145,537	63,451
Nov. 12	138,682	64,233
Nov. 19	149,753	68,476
Nov. 26	113,705†	46,740
Dec. 3	145,000*	55,337

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Another example of National Roll quality control

Deac Scholl, sales manager at National, discusses steel roll machining with Joe Rebar, right, roll shop superintendent.

Contour machining gives more precise shaped rolls

Some of the most impressive equipment installed in National's roll shop are the large contour lathes. Some of the largest ever made, these lathes faithfully follow the lines of carefully made templates in machining grooved steel rolls for the shaping of steel beams, rails and a multitude of other end products.

Lathes, grinders and other roll shop equipment at National have been selected specifically for the finishing of steel, iron and nodular iron rolls. A walk through this shop will convince you of the emphasis placed on quality in this phase of National's roll production.

We'd like to have you visit our modern roll producing plant at Avonmore. Failing that, we'll be glad to send you a new brochure which describes our new facilities, one of the reasons that...

National's the growing name in rolls

NATIONAL ROLL & FOUNDRY DIVISION

GENERAL STEEL CASTINGS CORPORATION, Avonmore (Westmoreland County), Pa.

General Steel Castings Corporation, General Offices: Granite City, Illinois • Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.

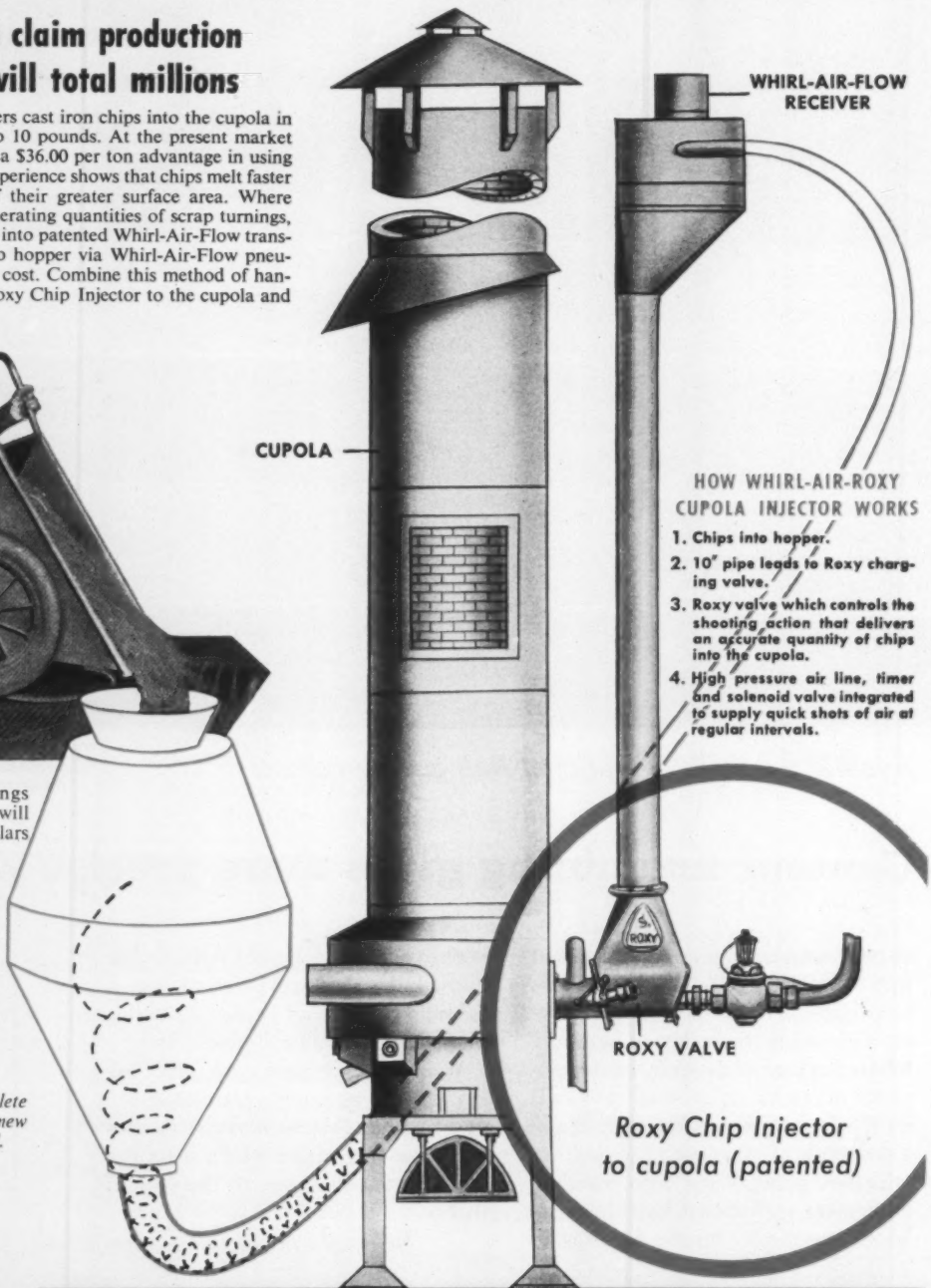
SAVE $36.00 a ton on cast iron chips

New Whirl-Air-Roxy method delivers chips from Machine Shop to Cupola *(patented)*

Foundries claim production savings will total millions

New Roxy valve delivers cast iron chips into the cupola in measured shots of 7 to 10 pounds. At the present market value of scrap there is a $36.00 per ton advantage in using chips. Also, foundry experience shows that chips melt faster than scrap because of their greater surface area. Where machine shops are generating quantities of scrap turnings, they can be discharged into patented Whirl-Air-Flow transporter and delivered to hopper via Whirl-Air-Flow pneumatic conveyor at low cost. Combine this method of handling chips with the Roxy Chip Injector to the cupola and you will achieve savings that foundrymen say will amount to a million dollars in very few years of operation. The Whirl-Air-Roxy method is easily applied to any size foundry; small, medium or large. Initial cost is low and savings will pay for installations in a period of a few months. We invite your exploratory inquiry.

Write or wire for complete information on the new Whirl-Air-Roxy method.


WHIRL-AIR-FLOW RECEIVER
CUPOLA
HOW WHIRL-AIR-ROXY CUPOLA INJECTOR WORKS
1. Chips into hopper.
2. 10" pipe leads to Roxy charging valve.
3. Roxy valve which controls the shooting action that delivers an accurate quantity of chips into the cupola.
4. High pressure air line, timer and solenoid valve integrated to supply quick shots of air at regular intervals.
ROXY
ROXY VALVE
Roxy Chip Injector to cupola (patented)

WHIRL AIR FLOW PNEUMATIC CONVEYORS

WHIRL-AIR-FLOW

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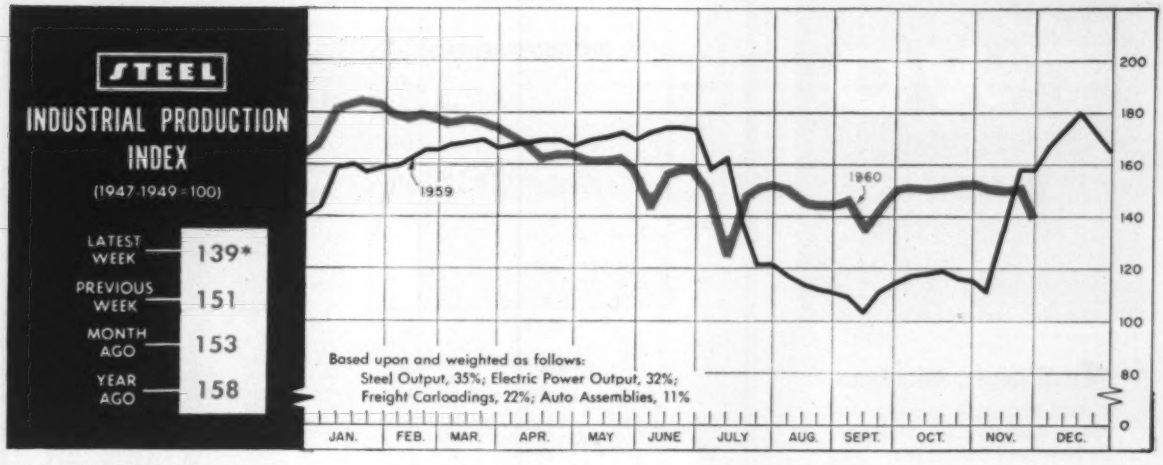

*Week ended Nov. 26.

Building to Prop Economy in '61

THREE TIMES since World War II, the construction industry has been one of the biggest factors in bringing the country out of a recession. The way things look now, the fourth time is close.

Here is one industry in which it is comparatively safe to make forecasts. Available are at least two reasonably accurate, timely sources for information on the dollar value of contracts awarded: F. W. Dodge Corp. reports and *Engineering News-Record*. What they report on a weekly or monthly basis is turned into planned expenditures according to a fairly well defined pattern. And their reports have been uniformly bullish recently.

(A third source—Dun & Bradstreet Inc.'s building permit values for 199 cities—is also highly regarded but is more limited in scope. It is following a trend similar to the other two.)

• **Basis for Record** — Contract awards in October set a record for that month, declares F. W. Dodge. (See graph and table, Page 80.) Seasonally adjusted, it was also the best month since April, 1959. As Dr. George Cline Smith, Dodge vice president and economist, points out, that will mean high level construction activity for many months to come, and "help to insure that the current business dip will be quite mild and of short duration." The rise to a little over $3.3 billion was the result of strength in commercial and heavy engineering.

The uptrend continued strongly throughout November, as shown in *Engineering News-Record*'s reports. During the week ended Nov. 23, awards totaled $613.4 million, the highest since the end of June. For the year to date, contracts for future work come to $21 billion, a margin of 14 per cent over 1959. As recently as last September, the gain was only 10 per cent. Some of the comparative improvement is accounted for by a decline in awards during late 1959, but the

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,404[1]	1,367	2,650
Electric Power Distributed (million kw-hr)	13,500[1]	14,042	13,173
Bituminous Coal Output (1000 tons)	7,985[1]	7,365	9,602
Crude Oil Production (daily avg—1000 bbl)	6,950[1]	6,968	6,969
Construction Volume (*ENR*—millions)	$613.4	$473.6	$391.3
Auto, Truck Output, U. S., Canada (*Ward's*)	138,374[1]	179,928	60,052
TRADE			
Freight Carloadings (1000 Cars)	500[1]	567	574
Intercity Truck Tonnage (changes from year ago)	−2.2%	−6.0%	+1.7%
Business Failures (Dun & Bradstreet)	329	298	287
Currency in Circulation (millions)[3]	$32,532	$32,527	$32,269
Dept. Store Sales (changes from year ago)[3]	−7%	−2%	+8%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$29,470	$26,029	$26,056
Federal Gross Debt (billions)	$290.1	$290.6	$290.5
Bond Volume, NYSE (millions)	$21.5	$24.7	$26.0
Stocks Sales, NYSE (thousands of shares)	12,709	13,969	13,699
Loans and Investments (billions)[4]	$107.3	$106.7	$104.3
U. S. Govt. Obligations Held (billions)[4]	$29.1	$28.9	$27.5
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	222.0	222.1	231.7
All Commodities[7]	119.7	119.6	119.0
Commodities Other than Farm & Foods[7]	127.9	128.0	128.7

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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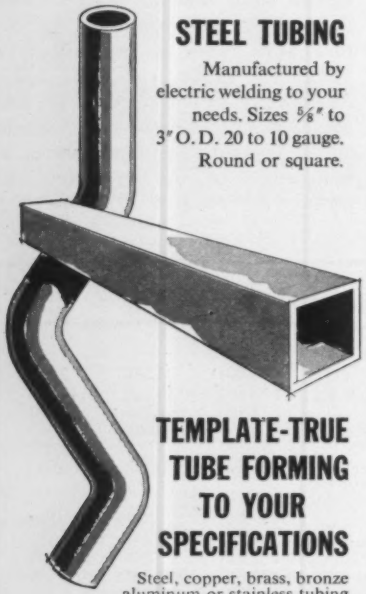
to serve you

1. Sturgis, Michigan

In heart of metal working industry.
Seven large truck line terminals.
New York Central and
Pennsylvania Railroads.

2. Haleyville, Alabama

Convenient to Birmingham.
On U. S. Highway 278.
Southern and Illinois Central Railroads.



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Manufactured by electric welding to your needs. Sizes ⅝" to 3" O.D. 20 to 10 gauge. Round or square.

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Steel, copper, brass, bronze aluminum or stainless tubing fabricated to your specifications. Sizes ⅜" to 6" OD, 20 to 10 gauge.

Thirty-four years of experience in forming, welding, beading, bending, stamping of formed tubes.

Top-flight engineering service.

Write, wire or phone for booklet or quotation.

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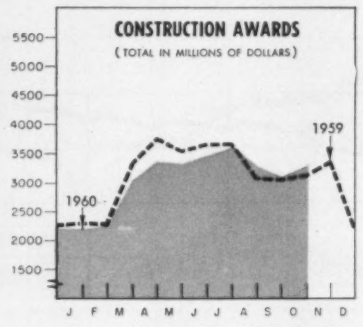
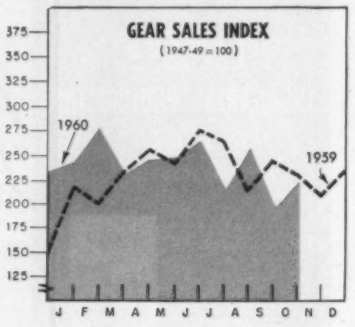
THE BUSINESS TREND





	Total		Building	
	1960	1959	1960	1959
Jan.	2,192.9	2.314.4	1,728.4	1,834.9
Feb.	2,239.5	2.307.0	1.685.1	1.777.4
Mar.	3,046.3	3,339.9	2,361.1	2,453.9
Apr.	3.359.8	3.778.4	2,527.3	3.018.0
May	3.336 7	3.541.9	2,562.5	2,748.8
June	3.472.3	3.659.0	2,592.8	2,816.9
July	3.596.9	3.656.5	2.481.2	2.880.8
Aug.	3.295.2	3.083.6	2,549.9	2,512.3
Sept.	3,118.8	3.058.1	2.401.8	2,472.3
Oct.	3,319.1	3.134.5	2,555.1	2.518.4
Nov.	.....	3,372.8	.....	1,893.0
Dec.	.....	.....	.....	1,783.4
Totals	.....	36,475.0*	.....	28,714.9*

*Monthly figures do not add up to totals because of yearend revisions.
F. W. Dodge Corp.

	Bookings		Shipments	
	1960	1959	1960	1959
Jan. ...	243 4	218.6	207.3	187.7
Feb. ...	278.6	199.9	230.2	201.5
Mar. ...	231.8	234.3	244.6	222.7
Apr. ...	249.2	255.6	234.8	231.8
May ...	246 9	241.0	241.3	223.9
June ...	269.8	274.2	253.6	239.7
July ...	217.5	262.8	210.8	199.8
Aug. ..	255.8	213.3	217.3	201.3
Sept. ..	197 9	213.9	223.5	216.1
Oct. ...	219.9	230.5	220.6	224.1
Nov. ...	....	208.7	....	224.2
Dec. ...	....	233.9	....	250.2
Avg ...	....	234.7	....	218.8

American Gear Mfrs. Assn.

Charts copyright, 1960, STEEL.

strength of the 1960 uptrend is evident from the fact that awards in the first 47 weeks of this year already surpass the 1959 total.

• **Should Get Better**—Even if contracts were to slip for a month or two, those already on the books would be sufficient to give 1961 a good first half in work put in place. It is likely that awards will take another step forward in the first half, assuring equally good building activity for the late stages of next year and early 1962. Reason: The huge bond issues (about $3.3 billion worth) which the voters approved Nov. 8. Some of those projects will come up for bidding shortly, because they were in advanced planning stages when they were defeated last May.

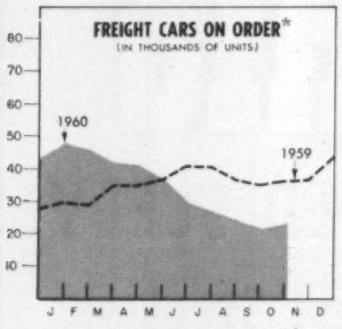
The biggest weakness in this year's picture—housing—will still be comparatively weak in 1961, but it should show a little improvement after midyear. The Commerce Dement predicts that private home building in 1961 will be about 4 per cent better than it is this year.

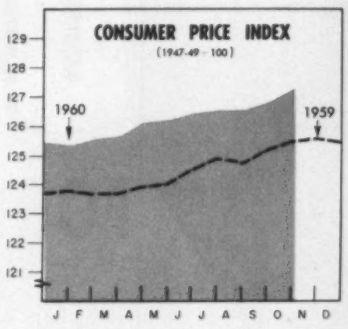
Autos, Income Raise Hopes

Two areas which command universal interest are keeping hopes high for a short, relatively painless recession. They are the auto industry and personal income.

If there is a recession, officials in motordom don't know much about it, because their products are selling almost as fast as they make them. Sales in the Nov. 11-20 span averaged 20,598 units a day, the second best mark for that period. (The record was set in 1955.) Dealers had to average only about 19,400 units a day in the last third of the month, or less than in the first two-thirds, to chalk up a 500,000 unit sales month. That's a good possibility, especially with a good supply of bargain priced 1960 models on hand (about 140,000 units prior to Thanksgiving) and a well-accepted array of new compacts.

Ward's Automotive Reports claims that dealers' stocks of domestic new cars jumped 51,000 units between Nov. 1 and Nov. 20 to a total of 971,000 units. If dealers' inventories can be held below the million unit level in early December, it is likely that auto producers will finish the year with another half million unit production month. That would forestall the drastic cutbacks seen only a couple of weeks ago and allow the industry to gradually soften its schedules





	Domestic Awards		Backlogs (end of month)	
	1960	1959	1960	1959
Jan.	7,149	4,102	48,170	29,470
Feb.	3,411	1,842	46,323	28,789
Mar.	1,959	10,782	42,131	35,487
Apr.	5,551	3,736	41,003	35,479
May	2,234	5,253	36,106	36,869
June	321	8,369	29,555	40,973
July	1,306	4,159	26,658	40,309
Aug.	1,343	1,653	23,866	37,172
Sept.	2,061	943	21,662	35,626
Oct.	5,885	2,722	22,900	36,199
Nov.	....	2,424	.....	36,555
Dec.	....	10,560	.....	43,870
Total	....	56,495		

*Domestic only.
American Railway Car Institute.

	1960	1959	1958
Jan.	125.4	123.8	122.3
Feb.	125.6	123.7	122.6
Mar.	125.7	123.7	123.3
Apr.	126.2	123.9	123.5
May	126.3	124.0	123.6
June	126.5	124.5	123.7
July	126.6	124.9	123.9
Aug.	126.6	124.8	123.7
Sept.	126.9	125.2	123.7
Oct.	127.3	125.5	123.7
Nov.	....	125.6	123.9
Dec.	....	125.5	123.7

U. S. Bureau of Labor Statistics.

in the first half of next year.

At the current rate of increase in personal income, it could well be that purchases of not only automobiles but also other hard goods will be a major stimulus to the economy in early 1961. Total personal income reached an all-time peak of $409.6 billion (annual rate, seasonally adjusted) in October, up $800 million compared with an increase of only $600 million in September. In addition, savings are increasing at a higher than usual rate. While some recent surveys tend to dampen the outlook on the consumers' willingness to buy major goods, there is no question that they are in a position to loosen the purse strings if they want to. A good Christmas season could be the tipoff on their plans.

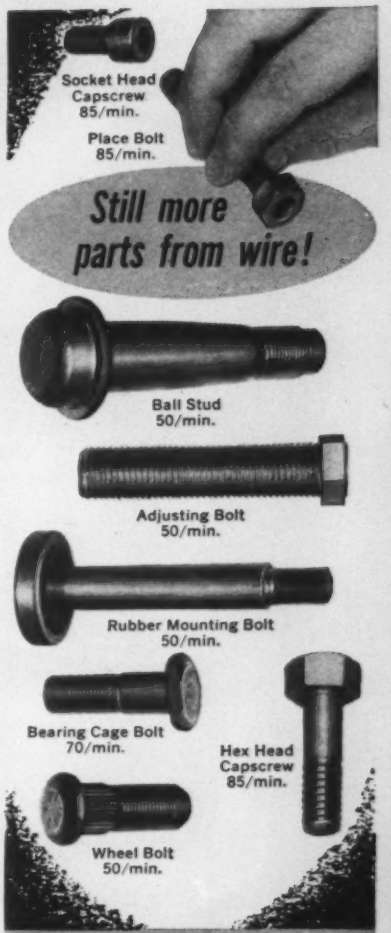
Layoffs Looking Better

Some of the business indicators which historically tend to lead the general economy are showing signs of an impending upturn. As noted on Page 93 of the Nov. 28 issue of STEEL, the average workweek in manufacturing turned up in October. An analysis of the trend in factory layoffs also reveals a possible upturn.

This trend line (inverted) has a good record of leading the Federal Reserve Board's industrial production index in the postwar period. It ran ahead of the three recessions from one to six months, and it signaled the recoveries by three to nine months. The only false alarm on the down side was in 1950-51—a characteristic of most of the leading indicators. (The FRB index leveled off, but did not collapse.)

The layoff rate per 100 production workers began to rise last February, fell during the second quarter, rose again through August and fell again in September. The FRB index began its decline in August, six months after the initial warning sign. If the decline in September layoffs was sustained in October (data should be available soon), it could be another indication that an upturn in the economy is due sometime in the second or third quarter of 1961. (Many economists are predicting this.)

Another leading indicator—gear sales (discussed on Page 89 of the Nov. 14 issue)—reversed its downtrend in October. (See graph and table, Page 80.) While volume increased 11.1 per cent, it failed to come up to the previous peak attained in August.

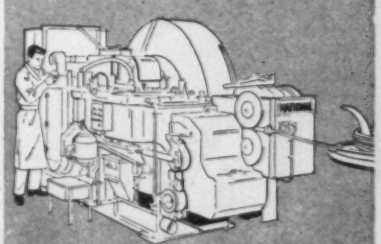


BOLTMAKERS make these interesting parts, and countless others, every day from wire.

Operations include cutting off, extruding, heading, trimming, pointing and thread-rolling.

It's just possible *your* metal parts can be made faster, stronger and at lower cost in Boltmakers (or in other types of Nationals).

May we help you investigate?



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4,200 PARTS PER HOUR!

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FORGED SLEEVES and Cast Steel or Forged Steel Arbors for Back-Up Rolls

A Complete Back-Up Roll Service

Ohio Steel, manufacturers of all types of iron, steel and forged steel rolls, announces a new complete back-up roll service.

Operations Now Include:

- Alloy Cast Steel Back-up Rolls and Arbors
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If you're looking for a complete back-up roll service that'll meet your most exacting specifications, contact your nearest Ohio roll sales engineer.

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PLANTS AT LIMA AND SPRINGFIELD, OHIO... *Virtually at the center of the steel industry*

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JOHN R. PARKER
A. O. Smith group v. p.

DR. ERWIN M. KOERITZ
GE Metallurgical Products post

RICHARD E. OLIVER
Natco purchasing agent

Keith T. Middleton was elected executive vice president, **Fafnir Bearing Co.**, New Britain, Conn. He was administrative vice president and secretary. **Beecher N. Claflin** was made assistant secretary; **Edwin A. Ingretsen** assistant treasurer.

John R. Parker was elected vice president, automotive and railroad products, **A. O. Smith Corp.**, Milwaukee. He succeeds **Urban T. Kuechle**. Mr. Kuechle and **James F. Jones** recently were given additional group responsibilities. Mr. Parker was director of sales and engineering for the automotive group.

Curtis R. Hammond was made commercial vice president-market development, **Raytheon Co.**, Waltham, Mass. He was director of commercial sales development, and continues to work with the firm's manufacturing divisions in maintaining liaison with executives in customer and prospect companies, and co-ordinating joint divisional sales activities.

Dr. Erwin M. Koeritz was appointed manager of manufacturing, Metallurgical Products Dept., Detroit, **General Electric Co.** Since 1956, he has been manager of manufacturing engineering in the firm's Silicone Products Dept., Waterford, N. Y.

Roger A. Ives was promoted from manager of sales to vice president-marketing, **Brown-Wales Co.**, Cambridge, Mass. He is in charge of sales, purchasing, and operations. **Andrew M. Wales**, in addition to duties as treasurer, was elected vice president-finance.

David L. Litten was appointed sales manager of **Westinghouse Electric Corp.'s** Lighting Div., Cleveland.

Hans Winzer, manager of foreign operations for Warner Electric Brake & Clutch Co., Beloit, Wis., for the last two years, was appointed managing director of **Warner Electric Ltd.**, Lausanne, Switzerland.

Richard E. Oliver was appointed head of the Purchasing Dept. of **National Automatic Tool Co.**, Richmond, Ind. Former assistant purchasing agent, he succeeds **Paul G. Nolte**, retired.

George L. Vasilow was made sales manager, **Henry F. Demski** assistant sales manager of **Emhart Mfg. Co.'s** Hudson, N. Y., Div.

Daisy Mfg. Co., Rogers, Ark., promoted **Sheldon Baker** from production manager to plant manager. He is responsible for the plant operation as well as the Tool & Die Dept. and the Maintenance Dept.

Charles L. Goss was named a product manager in the New Products Div. of **Corning Glass Works**, Corning, N. Y. He was plant quality and process engineer at the Parkersburg, W. Va., plant, and is succeeded by **J. Robert Jones**, senior equipment engineer there.

Walter B. Connolly was made gen-

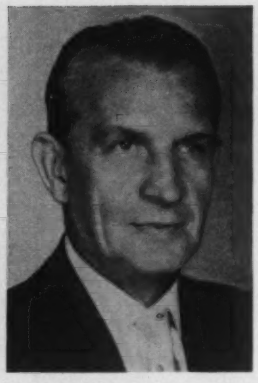
CURTIS R. HAMMOND
Raytheon marketing dev.

HAN WINZER
heads Warner Electric subsidiary

SHELDON BAKER
Daisy Mfg. plant mgr.

CHARLES L. GOSS
Corning Glass product mgr.

DENISON NEALE



LEROY E. BONNETTE

Denison Eng. marketing and engineering positions

AUSTIN J. PADDOCK

J. DONALD ROLLINS

U. S. Steel executive appointments

eral plants manager for **Chrysler Corp.**'s Stamping Group, Detroit.

Denison Neale was appointed vice president-marketing; **Leroy E. Bonnette** director-engineering for **Denison Engineering Div.**, American Brake Shoe Co., Columbus, Ohio. Mr. Neale was director of marketing. Mr. Bonnette was chief engineer.

Richard S. Hostetter has been appointed, effective Jan. 31, manager of industrial fastener sales, **Bethlehem Steel Co.**, Bethlehem, Pa. Assistant sales manager since 1957, he succeeds **Jay C. Miller.**

M. W. Winget was made marketing manager, Elevator Div., **Westinghouse Electric Corp.**, Pittsburgh.

James E. Spearman was elected vice president-sales; **Maurice A. Nye** vice president-engineering at **Vaughn Machinery Co.**, Cuyahoga Falls, Ohio. Mr. Spearman was sales manager and assistant to the president. Mr. Nye was chief engineer.

Austin J. Paddock was appointed administrative vice president, fabrication and manufacture, **United States Steel Corp.**, Pittsburgh. He is succeeded as president of **American Bridge Div.** by **J. Donald Rollins** who has been vice president-facility planning and appropriations for the corporation. The changes are effective Jan. 1. Mr. Paddock will be in charge of American Bridge, Consolidated Western Steel Div., Universal Atlas Cement Div., and United States Steel Homes Div.

Robert S. Kinsey and **Vernon L. Haag** were elected vice presidents of **Electro-Tec Corp.**, South Hackensack, N. J. Mr. Kinsey was director of engineering. Mr. Haag was director of manufacturing. He continues this responsibility, and assumes other related duties, such as quality control.

David H. Brown was appointed general manager, **Bendix-Pacific Div.**, North Hollywood, Calif., Bendix Corp. Former assistant general manager, he succeeds **R. C. Fuller**, now group executive in charge of all Bendix-Pacific and Bendix Computer Div. operations.

F. L. Ankenbrandt fills the new post of manager, defense product assurance, for the Defense Electronic Products Div., **Radio Corp. of America**, at Camden, N. J. **Frank G. Willey** was made manager, infrared systems, Missile Electronics & Controls Div., Burlington, Mass.

Dr. Charles F. Robinson, director of Bell & Howell Research Center, was elected a vice president of **Consolidated Electrodynamics Corp.**, Pasadena, Calif., subsidiary of Bell & Howell.

Drake Steel Supply Co., Los Angeles, appointed **A. H. Weinert Jr.** vice president-operations.

George E. Miller joined **C&S Products Co. Inc.**, Detroit, as manager, field sales and marketing. He was division sales manager for mold and core blowing machines at Beardsley & Piper Co. **David Spinner**

JAMES E. SPEARMAN

MAURICE A. NYE

Vaughn Machinery vice presidents

GEORGE E. MILLER

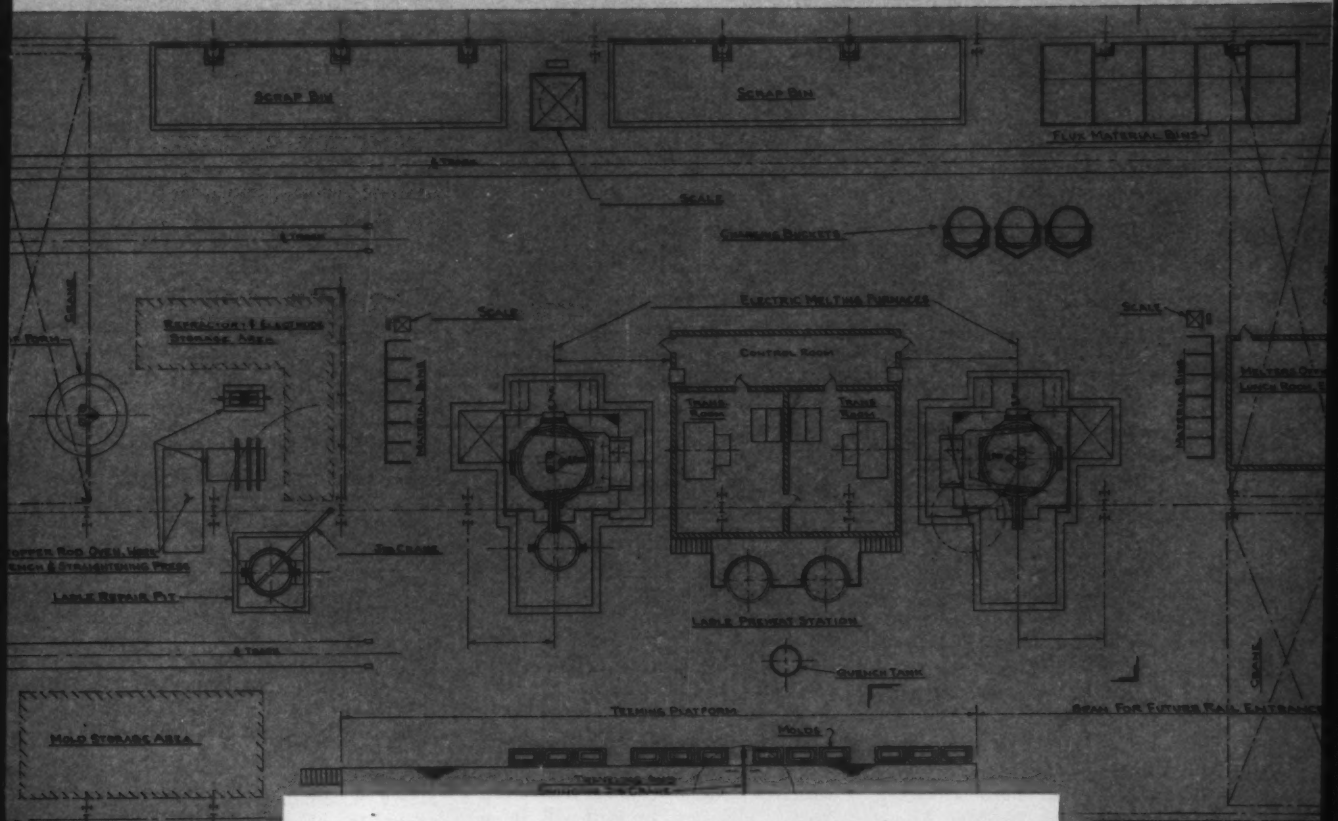
DAVID SPINNER

C&S Products sales and eng. posts

SWINDELL-DRESSLER

ONE HUNDRED AND TEN YEARS OF SERVICE TO THE METALS INDUSTRY

ENGINEERS and CONSTRUCTORS



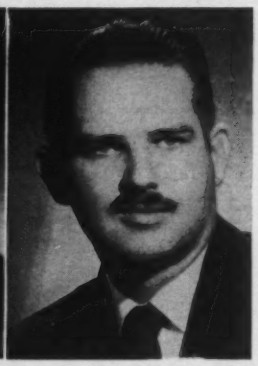
- Complete integrated steel mills
- Complete basic oxygen steel plants
- Complete electric steel melt shops
- Complete construction engineering

SWINDELL-DRESSLER CORPORATION
Engineers • Constructors • Manufacturers
PITTSBURGH 30, PA.
The SWINDELL-DRESSLER CORPORATION of Canada, Ltd.
Ottawa, Canada

SUBSIDIARY OF PULLMAN INCORPORATED

WILLARD W. WAKEFIELD
C. B. Herrick sales mgr.

WALTER E. LITTMANN
Timken research metallurgist



RICHARD E. GARNER
Kaiser Steel supt.

WALTER C. ARCHINAL
M&T supt.-coatings

WILLIAM E. RAY
Dresser Products research

FRITZ WANZENBERG
joins Amax

joined C&S as chief engineer. He was with Ford Motor Co.

Walter C. Archinal was made superintendent of coatings production at **Metal & Thermit Corp.'s** Carrollton, Ky., plant. **Donald C. Pratt** was made project supervisor, central engineering, with the company at Rahway, N. J.

George D. Haley was made supervisor in charge of hard surfacing rod production for **WaiMet Alloys Co.**, Dearborn, Mich. He was with Wright Air Development Center's Materials Laboratory.

Roy P. Jackson was named manager of Ford Motor Co.'s **Aeronutronic Co.'s** marketing staff, Los Angeles. **Robert B. Katkov** was made general operations manager, weapons systems operations.

Korhumel Steel & Aluminum Co., Evanston, Ill., and its subsidiary, **Mill Strip Products Co.**, appointed **David U. Thomas** district sales manager in Detroit.

William E. Ray was appointed director of research of **Dresser Products Inc.**, Great Barrington, Mass. For the last five years, Mr. Ray was a metallurgical consultant on submarine reactors at Knolls Atomic Power Laboratory operated by General Electric Co. at Schenectady, N. Y.

Fritz Wanzenberg was named systems and procedures manager for **American Metal Climax Inc.**, New York. His first project will be a feasibility study on possible use of data processing equipment in the corporation's divisions. He was with Booz, Allen & Hamilton, consultants.

Joseph Bertuglia was made production manager; **Thomas Reid** superintendent, Foundry Div., **International Casting Corp.**, New Baltimore, Mich.

Edward E. Williams was made manager, Design & Development Section, **Schaevitz Engineering**, Pennsauken, N. J.

Willard W. Wakefield was named sales manager, **C. B. Herrick Mfg. Co.**, Cleveland. For the last five years, he has been chief engineer.

Walter E. Littmann was promoted to chief research metallurgist, **Timken Roller Bearing Co.**, Canton, Ohio. He succeeds **Arthur L. Christenson**, now assistant to the general manager, steel and tube operations. **Chester F. Jatczak** was made section chief, physical metallurgical research, succeeding Mr. Littmann.

Richard E. Garner was appointed superintendent, Industrial Engineering Dept., at **Kaiser Steel Corp.'s** Fontana, Calif., plant.

Endicott Forging & Mfg. Co. Inc., Endicott, N. Y., elected **A. L. Coleman** vice president and general sales manager. He has been sales manager since 1951.

Henry F. Peters, former market development manager, Lukens Steel Co., was named marketing manager for metal products in the Pigments Dept. of **E. I. du Pont de Nemours & Co. Inc.**, Wilmington, Del.

Thaddeus Giszczak was promoted to chief metallurgist, Central Foundry Div., Saginaw, Mich., **General Motors Corp.** He was chief metallurgist of the division's Defiance, Ohio, plant.

OBITUARIES...

Victor Emanuel, 62, chairman, **Avco Mfg. Corp.**, New York, died Nov. 26.

Harry A. Seymour, 61, purchasing agent, **Worthington Corp.**, Buffalo, died Nov. 22.

Harold E. Taylor, 60, superintendent, Coke & Chemicals Dept., **Alan Wood Steel Co.**, Conshohocken, Pa., died Nov. 22.

Robert A. Mayne, 62, president, **Mayne Products Co.**, Dayton, Ohio, died Nov. 16.

Carl J. Kohler, 55, secretary, **Kohler Co.**, Kohler, Wis., died Nov. 11.

Daniel G. Slee, 67, president and treasurer, **Alloy Founders Inc.**, Toledo, Ohio, died Nov. 3.

INTERNATIONAL SILVER ANNEALS 35,000 LBS. OF BRASS & CUPRO-NICKEL A DAY

in these Power Convection bases

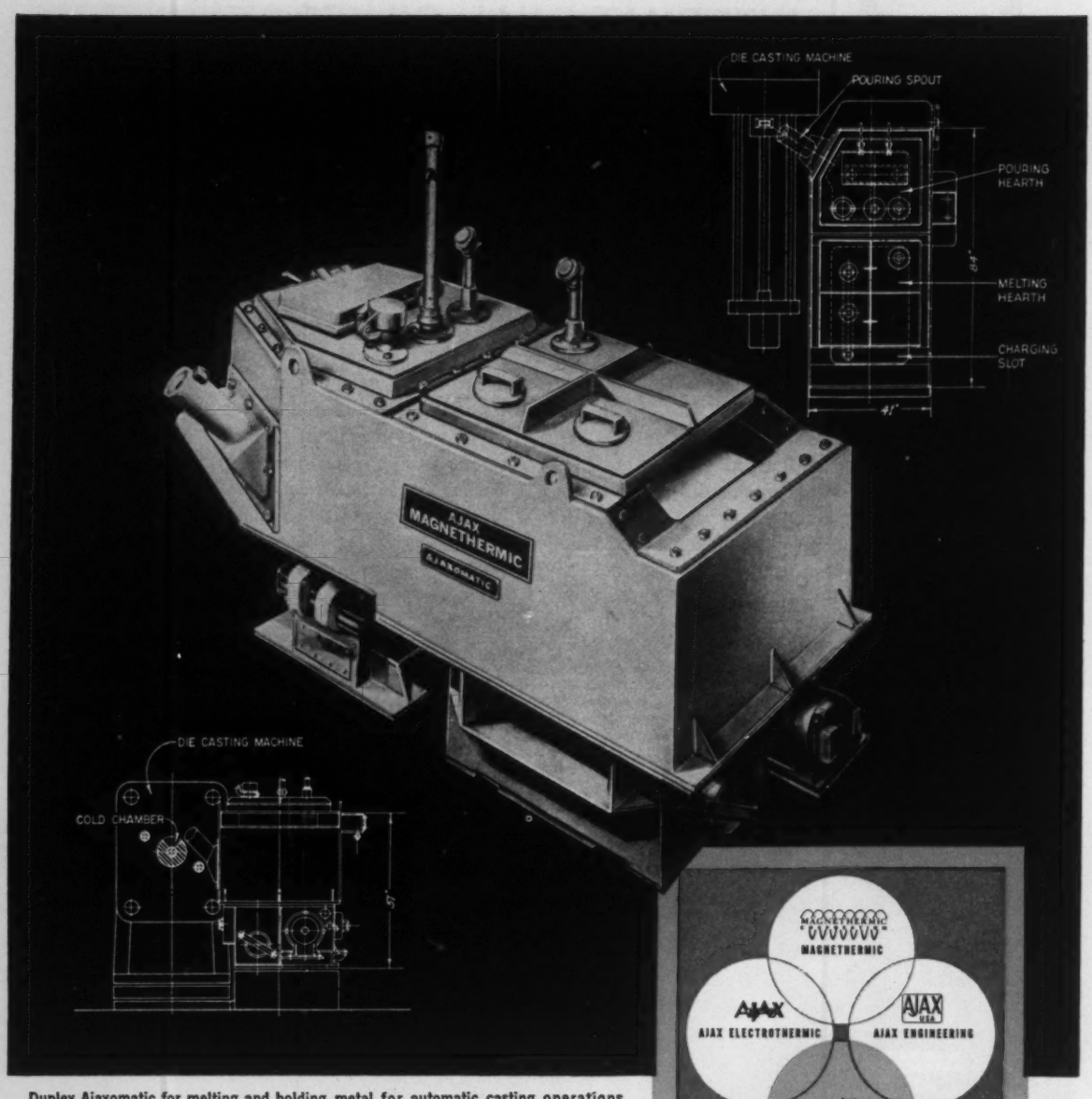
One man is now as productive as many 2-or-3 man annealing departments, and the tools that make him so valuable are these Surface Power Convection* annealing bases. Along with his production rate of 35,000 lbs. a day, he gets exceptional quality in his finished brass and cupro-nickel coils. Power Convection equipment never lets the temperature vary more than 10°F from top to bottom of a load. While one load is heating or soaking, a second is cooling, and the operator prepares the third load on its tray. A single crane handles all loading and unloading.

All the operator does to start a heating cycle is make a single electrical connection between cover and base. The International Silver Company, Meriden, Connecticut, is one of many manufacturers who are realizing higher earnings from Surface Power Convection equipment. You can be another, simply by calling Surface Combustion, 2385 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces Ltd., Toronto, Ont.

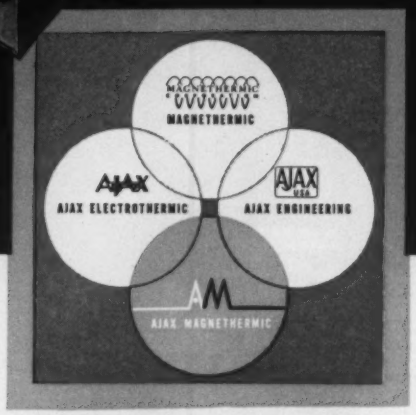
*Trademark of Surface Combustion, Division of Midland-Ross Corp.

Surface®

A division of Midland-Ross Corporation MR



Duplex Ajaxomatic for melting and holding metal for automatic casting operations.



WATCH AM

FOR THE NEW IDEAS IN HEATING AND MELTING BY INDUCTION

The Automatic Pouring Ajaxomatic, one of many products by AM, for the heating or melting of metals by Induction.

"induction heating is our only business"

AJAX Magnethermic CORPORATION

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Youngstown 1, Ohio

TRENTON DIVISION
930 Lower Ferry Road
Trenton 5, New Jersey

YOUNGSTOWN DIVISION
3990 Simon Road
Youngstown 1, Ohio

U. S. Participation in World Marketing Widens

METAL producing and fabricating firms in this country are penetrating deeper into world markets. These are recent developments:

• **Kaiser Aluminum & Chemical Corp.**, Oakland, Calif., and Consolidated Zinc Corp. Ltd., London, plan a joint venture to establish a huge aluminum complex in Australia and New Zealand. They will develop vast bauxite mining reserves and hydroelectric power in the construction of what they describe as the largest integrated aluminum facilities in the Southern Hemisphere.

"During 1961, Kaiser Aluminum will invest more than $10 million for development and expansion of properties presently held by Consolidated Zinc," says D. A. Rhoades, president of Kaiser Aluminum. "We also will participate equally with Consolidated Zinc in construction of additional facilities during the next six years."

Major projects planned:

• Development of bauxite mining reserves in the Weipa area on Cape York peninsula, Australia.

• Construction of a 360,000 long ton alumina refinery at Weipa.

• Expansion of the Bell Bay, Tasmania, aluminum reduction works from 12,000 long tons a year of primary aluminum capacity to at least 28,000 tons.

• Development of a hydroelectric power source using waters of Lakes Te Anau and Manapouri in New Zealand. The generating system will be rated at 280,000 kw initially and is designed for enlargement.

• Construction of a new aluminum reduction works at Bluff, New Zealand, near Invercargill. This works will have an annual capacity to produce 120,000 long tons of primary aluminum, using Manapouri power and Weipa alumina.

• Establishment of fabricating facilities.

Plans call for the completion of these projects by mid-1966:

• **Gabriel Co.**, Cleveland, and Anand Automobiles of India have joined in establishing Gabriel India Private Ltd. to manufacture automotive shock absorbers. A manufacturing plant is being built at Agra Road, Mulund, Bombay, India, and is expected to begin operations early next year. D. C. Anand Jr. is managing director of the undertaking. Establishment of Gabriel India is a part of the expanding scope of Gabriel International Div., headed by Frank S. Wilson.

• **Minnesota Mining & Mfg. Co.**, St. Paul, will construct a coated abrasives plant at St. Marys, New South Wales, Australia. It will have about 40,000 sq ft of floor space and will be in production early in 1962. The firm's Australian subsidiary presently occupies nearly 90,000 sq ft of space in that city. It's devoted to manufacturing and converting operations.

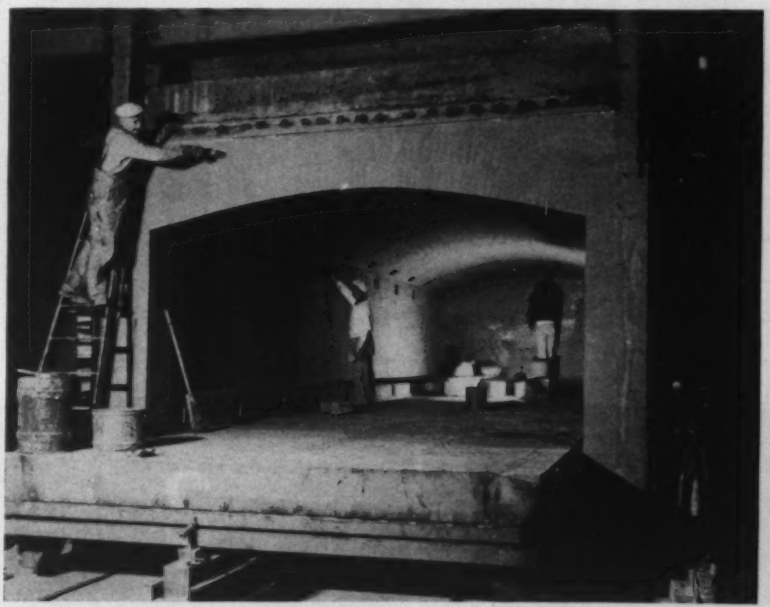
• **Allegheny Ludlum Steel Corp.**, Pittsburgh, has formed Allegheny Ludlum International S.A. with headquarters in Geneva, Switzerland.

• **International General Electric** and Societe Generale de Constructions Electriques et Mecaniques have been awarded a contract valued at more than $3.5 million for electrical equipment for one of the fastest tandem cold rolling steel mills on the European continent. Societe Lorraine de Laminage Continu of France will install the 6000 fpm mill at its Florange plant near Thionville, France. It is expected to be in commercial operation early in 1963. The overseas marketing organization of General Electric Co., Schenectady, N. Y., will supply the main drive motors (totaling about 24,000 hp), the main drive control, x-ray gages for continuous checking and automatic correction of thickness, and data logging equipment to record thickness as the steel is processed. Five GE plants in as many states will provide equipment for the mill.

Plans Titanium Plant

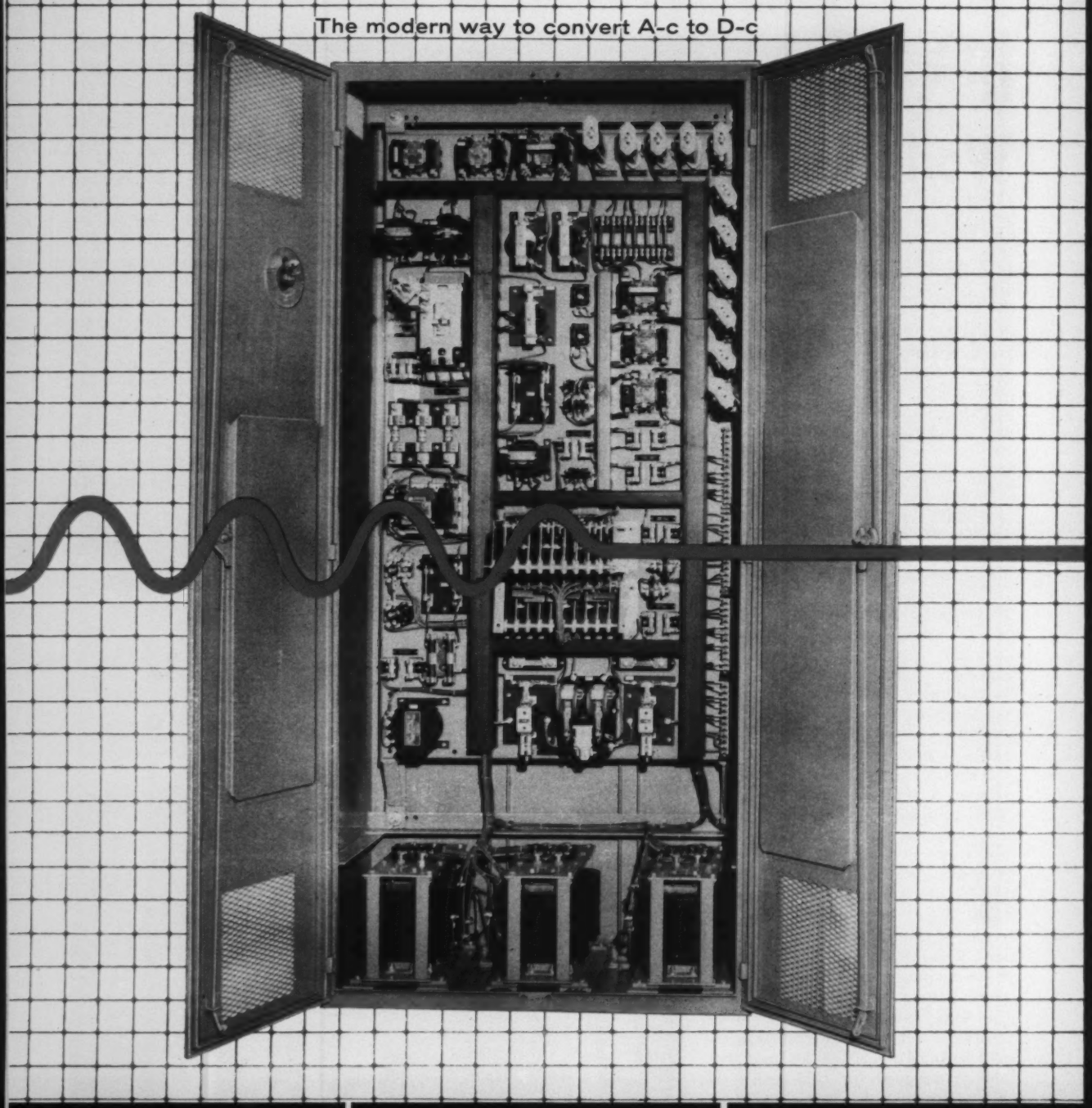
American Potash & Chemical Corp., Los Angeles, and Laporte In-

(*Please turn to Page* 92)



GAS FIRED FURNACE, one of the nation's largest heat treating units, is being installed in the plant of Pittsburgh Commercial Heat Treating Co., Pittsburgh. Measuring 40 x 12 x 5 ft, the furnace will initially treat huge cylinders used as gas storage tanks at missile launching sites. The cylinders are heated to 1600° F and then quickly quenched in an adjacent 37½ x 8 x 7 ft quench tank

The modern way to convert A-c to D-c



1

15% more efficiency
(than m-g conversion)

2

Greatly reduced maintenance
(no moving parts to wear out)

3

Far less floor area & weight
(up to 50% less floor area. Up to 75% less weight)

CONTROL

What's new in static power?

Cutler-Hammer's Ultraflex ...the modern, proved adjustable speed D-c Drive

No moving parts . . . nothing to wear out, replace or clean . . . takes less space, and it's production proved. You can cut installation, maintenance and production costs with *proved* Ultraflex Static Power adjustable speed drives.

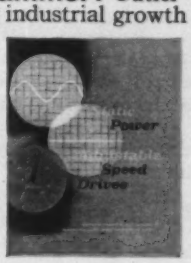
They're proved in heavy duty applications such as in steel mills and tire making plants. They're proved in precise applications such as in newspaper printing, continuous process lines and paper converting.

You can get 15% more efficiency than with m-g sets. Cuts your production costs. No forced ventilation needed for cooling either. And, a unique flux cancellation design avoids dangerously high voltages.

Standard drives give you an 8:1 speed range with wider range, special engineering service, precise regulators and other optional equipment available. Check with us for details.

You can get Ultraflex M Drives in sizes up to 200 h.p. Ultraflex E units are also available which use electronic tubes for conversion instead of magnetic amplifiers. Ultraflex E Drives are smaller, lighter and lower-priced than Ultraflex M and come in sizes up to 40 h.p.

What's new at Cutler-Hammer? Cutler-Hammer is ready for the big industrial growth of the sixties. We've added engineering talent, plant capacity, new and better products. We'd like to show you how we could help you. Contact the nearest Cutler-Hammer sales office.



Free! Booklet about Ultraflex M. Ask for Pub. EN-65-Y213.

WHAT'S NEW? ASK...

CUTLER-HAMMER

CONTROL

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

A Complete Range of Heat and Corrosion Resistant Steel Castings . . .

Unitcast's 40 years experience as one of the nation's most progressive steel founders, now expands its proved engineering and production facilities to serve the "stainless" market.

Typical of such requirements is illustrated by the fluid pump chamber that pressurizes corrosive liquid. Cast to specification CF-8 (A.I.S.I. 308), this casting will provide long, corrosion-free service to improve the product dependability.

Industrial users of Unitcast's advanced methods in stainless steel as typified by manufacturers that produce oil well equipment, special valves, pumps, compressors and turbines, food processing machinery, dies and fixtures, and heat treating equipment.

An analysis of your needs incurs no obligation on your part. Our technical staff may provide the answer to your problem. Get in touch with us today!

UNITCAST CORPORATION, Steel Foundry Division, Toledo 9, Ohio
In Canada: CANADIAN-UNITCAST STEEL, LTD., Sherbrooke, Quebec

Unitcast

SPECIFICATION STEEL CASTINGS

(*Concluded from Page 89*)

dustries Ltd. of Great Britain are planning a joint operation to manufacture titanium dioxide on the West Coast. American Potash will own 85 per cent of the new enterprise; Laporte Titanium Ltd., one of the two largest producers of titanium pigments in the United Kingdom, will own 15 per cent. A plant with initial annual capacity of 25,000 tons is scheduled to commence production in the latter part of 1962. Estimated capital investment: $15 million.

Ampco Licenses Firm

Erie Bronze Co., Erie, Pa., has been appointed a licensed foundry by Ampco Metal Inc., Milwaukee. Erie Bronze will supply custom castings of special copper base alloys produced by the Milwaukee firm.

Acquires Becker Crane

Paterson-Leitch Co., Cleveland, operator of a steel service center, has entered the material handling field with the purchase of Becker Crane & Conveyor Co., Cleveland. The new firm will operate as a wholly owned subsidiary with Frank N. Becker continuing as president.

Press Brake Div. Formed

Valeron Corp., Detroit, has organized a Press Brake Div. which will make press brake tooling exclusively. The division will occupy a 17,000 sq ft plant at 56 Factory Rd., Addison, Ill.

Plant Addition Completed

Steelwork has been completed by Whitehead & Kales Co., Detroit, on a 250,000 sq ft addition to the Kelsey-Hayes Co. wheel plant in Romulus, Mich. The addition contains about 15,000 tons of structural steel.

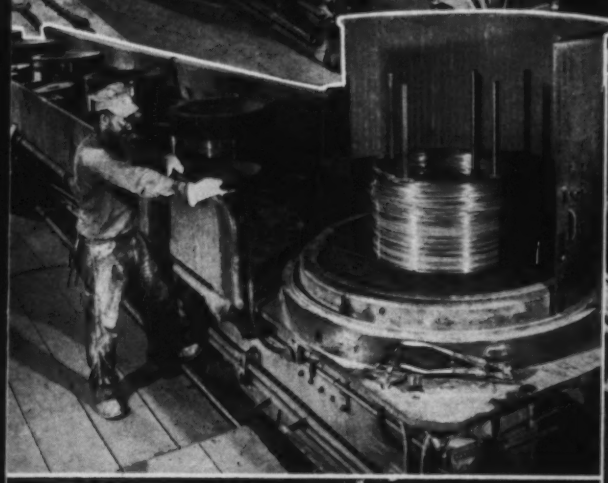
Fenn Mfg. Enlarges Plant

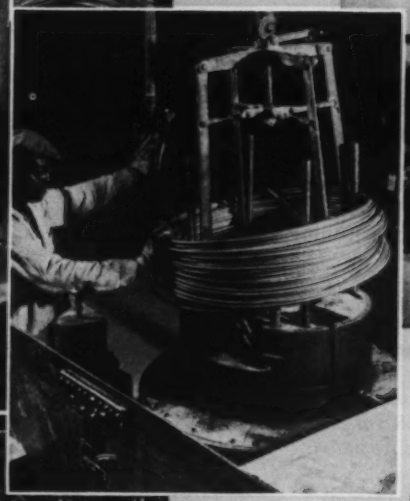
Fenn Mfg. Co., Newington, Conn., is erecting a plant addition that will increase manufacturing area by one third. With the addition, Fenn will have about 150,000 sq ft of area devoted to production of precision metal forming machinery, and aircraft, missile, and

VAUGHN® at Aliquippa

MODERN EQUIPMENT FOR FINER AND FASTER WIRE PRODUCTION

Typical of J & L modernization at the Aliquippa plant are the many Vaughn wire drawing machines installed at that location over the past 5 years. These Vaughn units bring the latest advances in speed, safety and operating ease to the production of top quality J & L wire—joining the ranks of dependable Vaughn equipment at Aliquippa performing so faithfully over the years.





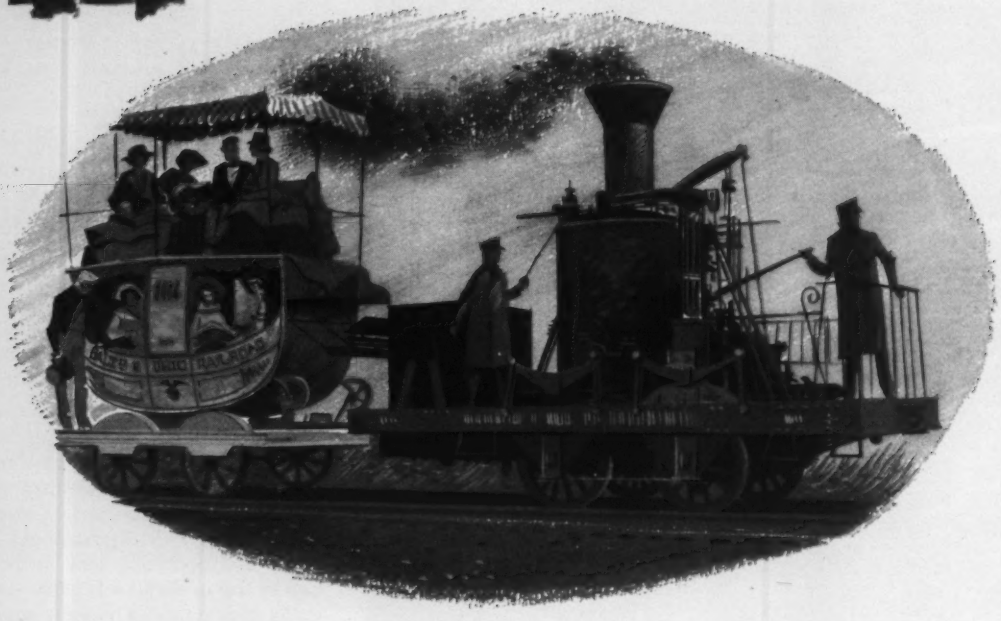
"Quick on the Draw!"

The VAUGHN MACHINERY COMPANY

Cuyahoga Falls, Ohio, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

AMERICAN ORIGINALS IN IRON AND STEEL



HAND IN HAND THEY GREW . . .

As the need for heavier railroad rails grew, so did the iron industry. The first railroads began with wooden rails which were iron-topped. It was not until 1844 that "heavy," entirely iron rails went into production at the Mt. Savage Rolling Mill in Allegheny County, Maryland. It was 21 years later, in 1865, when the first steel rail was rolled from a Bessemer ingot at the North Chicago Rolling Mill Co.

One of the first "iron horses" to snort flame, belch smoke and cinders, and scare livestock was the "Atlantic." Built in 1832 by Phineas Davis in York, Pennsylvania, the "Atlantic" was placed into operation by the Baltimore & Ohio Railroad. In 1835 the "Atlantic" led a procession of trains into Washington, D. C.

As have the railroads and the iron and steel industries grown, so has Baker's Magdolite, the original dead-burned dolomite. Continued research and product improvement assure that Baker's Magdolite is always 5 ways better, in composition, preparation, economy, strength and quality. The next time you buy, be sure to specify Baker's Magdolite, the original dead-burned dolomite.

ANOTHER AMERICAN ORIGINAL

JEBCO
PRODUCTS
SINCE 1889

BAKER'S MAGDOLITE
The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

nuclear components, and other items.

Ups Coated Sheet Capacity

The third, galvanized steel, sheet production line planned for U. S. Steel's Gary (Ind.) Sheet & Tin Mills will be an all purpose type. It will be capable of producing galvanized and aluminum coated steel in widths up to 60 in. and in thicknesses of 14 to 28 gage, inclusive, in coils and cut lengths. The line will also produce galvannealed and USS Paint Bond sheets. It is scheduled for operation about mid-1962.

Improves Pipe Facilities

In a move to improve operating efficiency and reduce costs, Armco Steel Corp., Middletown, Ohio, will spend $2.5 million to consolidate its spiral welded pipe manufacturing operations in a fully integrated plant in that city (STEEL, Nov. 28, p. 57).

Four new buildings with 207,000 sq ft of floor space will be erected to accommodate the pipe manufacturing facilities now housed at the company's main fabricating plant, says L. T. Johnston, president. Construction work will begin early next year. Two, new Driam pipe machines will be installed. The machines will produce pipe with inside and outside welds and 100 per cent rated joint strength.

Concentration of spiral welded pipe production at the new plant will complete a program which was started in 1956. Removal of spiral welded pipe facilities from the main fabricating plant will provide additional space for the manufacture of formed products and new products.

ASSOCIATIONS

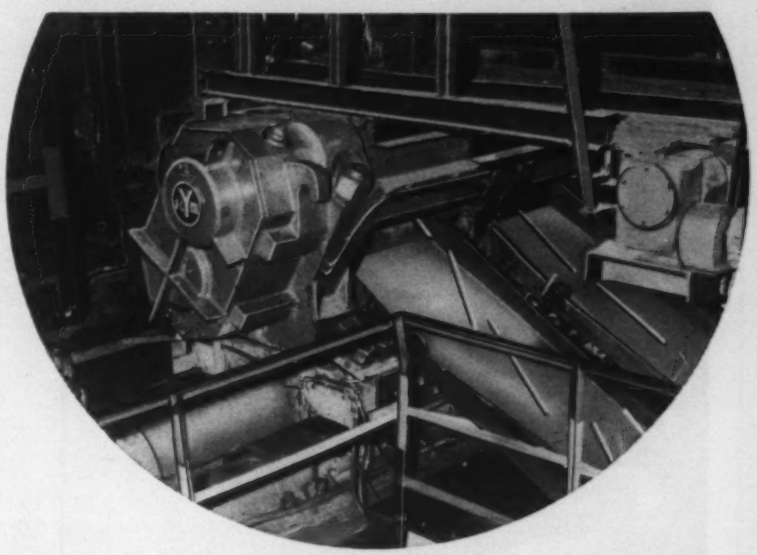
John H. Simonds, Simonds Abrasive Co., Philadelphia, was elected chairman of **Abrasive Grain Association**, Cleveland.

United Engineering Trustees Inc., New York, elected these officers: President, W. F. Thompson, Westcott & Mapes Inc., New Haven, Conn.; and vice presidents, J. F.

(*Please turn to Page* 98)

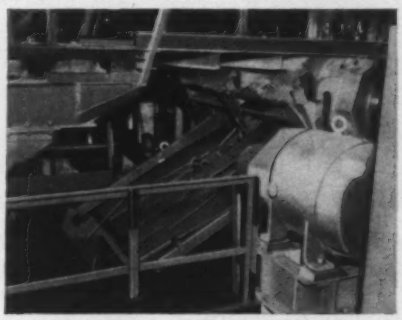
"YOUNGSTOWN"

Rotary-Type PLATE SCRAP CHOPPER



Unique Reciprocating Design prolongs knife life... saves downtime

Here's the scrap chopper designed for ruggedness and efficiency... built by "Youngstown" for a leading steel company. It handles side trimmer scrap 3" wide, ⅛" to ¼" thick and cuts to 14⅛" constant length at speeds of 45 to 180 fpm. This rotary type scrap chopper is also built for ¾" and 1" thick plate; it can be built integrally with a side trimmer for a new line or application.



Scrap sliding down exit chutes from rotary chopper onto conveyor which discharges into scrap box or railroad car.

The arbor and housing assembly is designed as a separate unit mounted on a motor driven reciprocating carriage. Each arbor is equipped with four 30" long knives, with the knives so spaced that only one side is cutting at a time. This feature, along with the reciprocating action, insures longer time between knife dressings.

This design provides a spare housing and arbor assembly so that knives can be changed or adjusted on the floor, saving valuable mill time while changing knives. Housing and arbor assembly change time is held to a minimum through fast disconnect from drive and reciprocating carriage. Write for complete information.

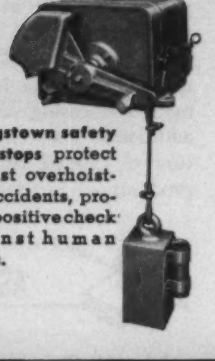
THE YOUNGSTOWN FOUNDRY & MACHINE CO. 75th ANNIVERSARY SERVING INDUSTRY SINCE 1886

The Youngstown Foundry & Machine Co.

Youngstown 1, Ohio

34

You seldom need this sign



Youngstown safety limit stops protect against overhoisting accidents, provide positive check against human errors.

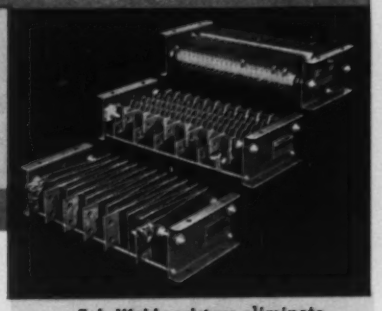
Write for Bulletins on any or all EC&M controls. They give complete descriptions of equipment and explain why EC&M control keeps cranes operating at top efficiency. Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio.

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

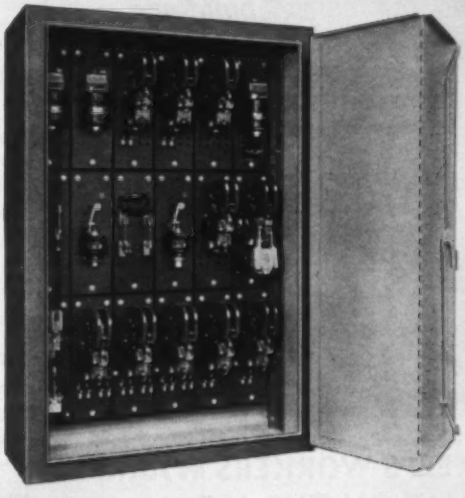
when your cranes are equipped

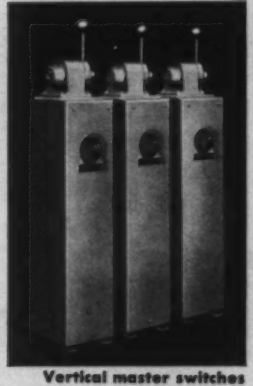
with EC&M CONTROL



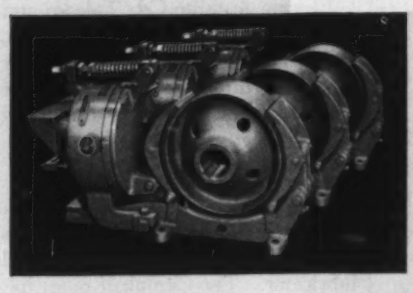
Tab-Weld resistors eliminate burning at the grid eyes or tap plates. Available in capacities from 13 to 500 amperes continuous.

DC controllers are simple to maintain, provide pinpoint accuracy and safe operation.

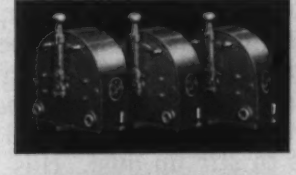




Vertical master switches require little mounting space. Short throw reduces operator fatigue.

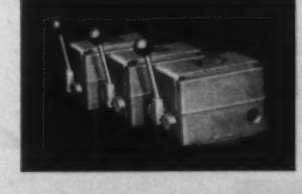


Long-life brakes give high-speed performance, have 100% lubrication so that dirt can be flushed out.



CM master switches have short throw of operating handle and narrow width for close grouping.

Manual-magnetic disconnect switches provide a convenient and quick means of "killing" the crane, including an emergency remote-controlled STOP button.



MA master switches provide a maximum of 3 speed points. Can be grouped with other masters or can be used on auxiliary drives.

WHEREVER ELECTRICITY IS DISTRIBUTED AND CONTROLLED . . . . .

3880

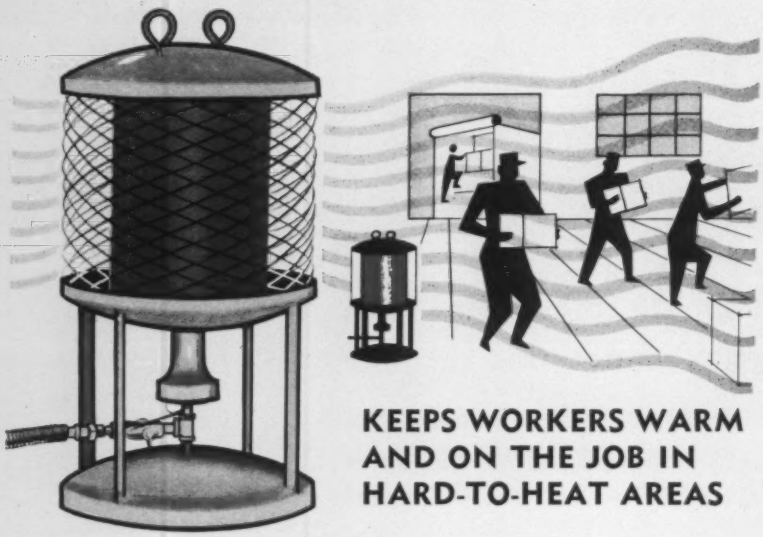
NEW! LOW COST!

SPACE-RAY

INFRA-RED

PORTABLE GAS HEATERS

for use in industrial and commercial buildings



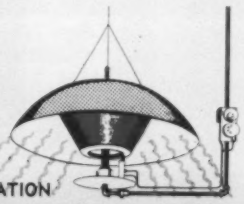
KEEPS WORKERS WARM AND ON THE JOB IN HARD-TO-HEAT AREAS

Space-Ray high capacity portable heaters beam warm infra-red rays out over the lower working level of buildings to heat men, floors, machinery and tools. Easily moved in minutes to new location for spot or supplemental heat. Large cylindrical stainless steel heat exchanger radiates more infra-red heat over a wider circular area than any portable heater of similar BTU input. Space-Ray low cost heaters operate on natural or LP gas, need no electricity ... no fans or blowers to stir up dust. Has 100% automatic shut-off valve for maximum safety. 50,000 and 100,000 BTU sizes.

SR

OVERHEAD INFRA-RED HEAT

Space-Ray Infra-Red Heaters also available in overhead model for permanent type installation.



WRITE FOR COMPLETE INFORMATION

SPACE-RAY CORPORATION

306 West Tremont Avenue, Charlotte 3, N. C.

(*Concluded from Page 95*)

Fairman, Consolidated Edison Co., New York, and L. C. Kemp Jr., Texaco Inc., New York.

Engineers Joint Council, New York, elected these officers: President, James N. Landis, Bechtel Corp., San Francisco; vice president, G. E. Holbrook, E. I. du Pont de Nemours & Co., Wilmington, Del.

CONSOLIDATIONS

United Sheet Metal Co., Columbus, Ohio, purchased **Biggs Steel Foundry & Fabricating Co.,** Akron, a subsidiary of Union Spring & Mfg. Co., New Kensington, Pa. The firm will be known as Biggs United Div. of United Sheet Metal and will continue to fabricate steel and alloy pressure vessels and other special equipment.

Sealol Inc., Providence, R. I., purchased **Spartan Aircraft Mfg. Corp.,** Yonkers, N. Y., manufacturer of miniature check valves and other precision hydraulic components.

Electric Autolite Co., Toledo, and **Hiller Aircraft Corp.,** Palo Alto, Calif., have merged. Stanley Hiller Jr. will continue as president of the Toledo firm's new subsidiary and will also become a director of Electric Autolite.

Sharon Metals Inc., Sharon, Pa., purchased **Campbell Metal Products Co.,** West Middlesex, Pa., a steel fabricator. The Campbell plant has 27,000 sq ft of floor space.

Bound Brook Oil-Less Bearing Co., Bound Brook, N. J., will become a wholly owned subsidiary of **Birfield Ltd.,** London, England, on Jan. 1 and will change its name to Bound Brook Bearing Corp. of America. Bound Brook produces bearings and structural parts for a wide variety of applications.

Dynamic Metals Corp. is being merged into **Beryllium Resources Inc.,** Beverly Hills, Calif., which is active in exploration and development of beryllium ores. Dynamic Metals has developed a new flotation process for the concentration

TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Johnston cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

With slabbers, the cooler the rolls, the longer they last

We have been somewhat concerned during the last year or so by what seems to us a more than normal number of premature roll failures in universal slabbing mills. These failures have not been limited to any one brand of rolls.

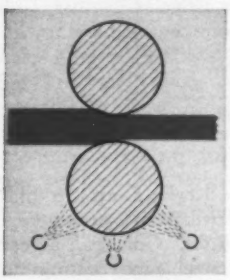
As a result, we have been checking among the many users of universal slabbers of our acquaintance, and in particular, with the operators whose mills have been giving them good outputs between roll replacements.

We think we have the answer to part of the problem, and will pass it along to you. Even if you don't operate a slabbing mill, you may find it helpful in connection with hot mill operation in general.

Not enough water. In every troublesome case that has come to our attention, too little cooling water was reaching the bottom roll, either because of an inadequate cooling system, or clogging of the spray header. Here is the way two steel plants are currently taking care of the problem:

CASE A: Water is applied to the top roll by means of a water box, with wipers on both entry and delivery sides. Three 4-inch pipes spray the bottom roll, one directly beneath the roll and the other two on the entry and delivery sides. When this mill was first installed, it had only one pipe directly beneath the bottom roll, which resulted in frequent roll breakage.

This mill is particularly careful about bringing the rolls up to working heat before beginning production. Standard practice is to pass two ingots three or four times through the mill, taking very mild reductions, with the water valves opened only half way. The two "start-up" ingots are then sent back to the soaking pit, the water is turned up to full pressure and a new, hot ingot is brought up to start the turn's regular production run.



Good blooming and slabbing mill roll-cooling arrangement utilizes two or more water lines to the bottom roll, which is usually the first to show signs of premature failure.

CASE B: This mill as delivered had only one spray header underneath the bottom roll. Bad fire cracking and roll breakage occurred almost from the day the mill was placed in production. Study of the mill showed that scale was lodging between the water pipe and the bottom roll, so that little if any cooling water was reaching the roll. Two additional water lines were brought in, each delivering its water about half way up the side of the roll. The general problem has been effectively solved by this expedient. Today, this mill at times rolls up to 140,000 tons before the rolls are redressed although normal practice is to change rolls after approximately 75,000 tons.

This is the mill described in Case A; it has an excellent record, thanks to careful control of heat in the rolls and the avoidance of sudden temperature changes.

Mack-Hemp has evolved a number of roll analyses that are especially good for slabbing and blooming work because of their combination of strength and resistance to fire cracking. Mack-Hemp *Technalloy* rolls cast from chrome-moly steel and specially heat treated offer excellent resistance to fire cracking and breakage under the most severe operating conditions. Mack-Hemp *Superalloy*, a nickel-chromium-molybdenum steel roll, turns in outstanding performance in blooming mills where side wear and fire cracking in the passes has been severe.

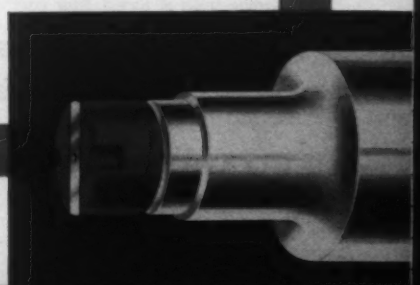
Whatever your problem of roll use, you'll find that Mack-Hemp can provide useful advice or helpful suggestions. We've been accumulating data on roll performance for more than a century and a quarter . . . it's yours for the asking. 'Phone or write us at any time.

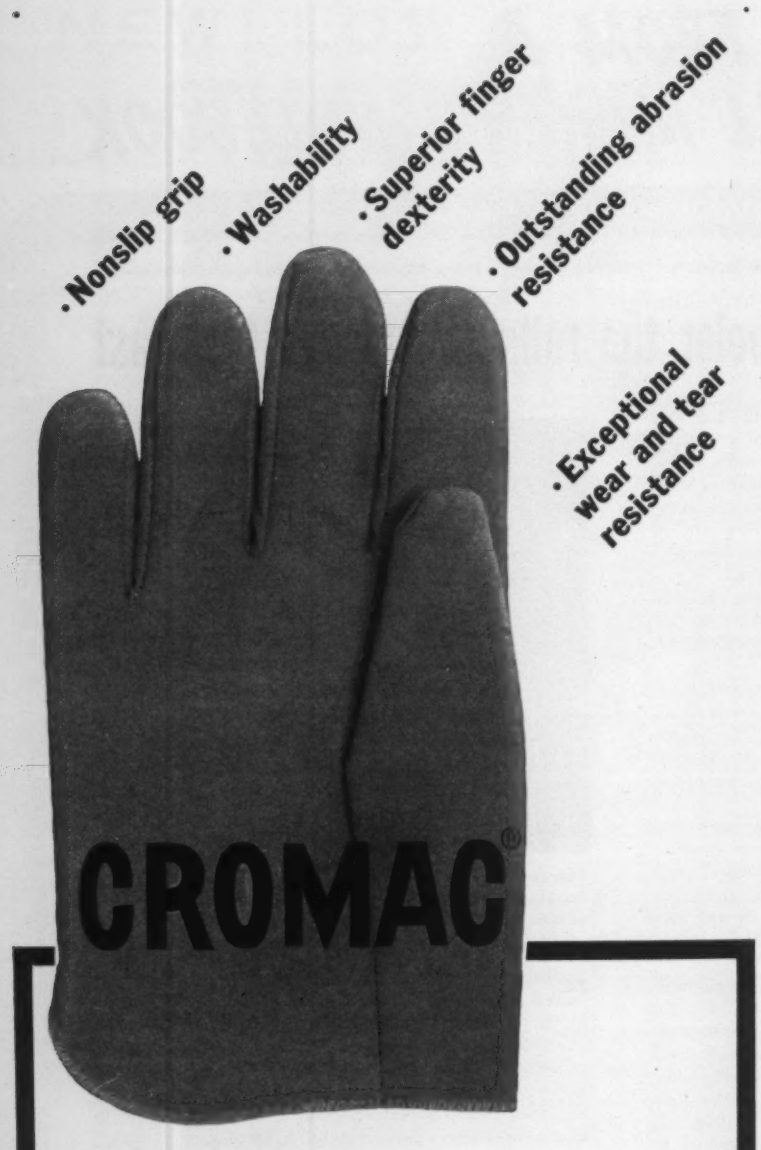
MACKINTOSH-HEMPHILL

You get more tonnage from the rolls with the Striped Red Wabblers

Division of E. W. BLISS COMPANY

Presses, Rolling Mills, Special Machinery





NEW!

Plastic-impregnated Cromac® gloves by Jomac that give unique 5-point glove performance

FREE SAMPLE PAIR will convince you . . . Cromac gloves by Jomac are all we say they are and more. Write Department E, Jomac Inc., Philadelphia 38, Pa.

JOMAC

"Jomac Sells Quality . . . and Quality Sells Jomac!"

of beryllium minerals. Brush Beryllium Co., Cleveland, and E. Van Dornick, vice president of Dynamic Metals, will acquire an interest in the surviving company.

Sprague Electric Co., North Adams, Mass., acquired **Vec Trol Engineering Inc.**, Stamford, Conn., manufacturer of industrial control devices, including silicon controlled, rectifier gate controls, and thyratron grid controls for industrial electrical apparatus. Walter J. Brown continues as president and chief engineer of Sprague's new subsidiary.

NEW PLANTS

Foote Mineral Co., Philadelphia, is constructing a plant at New Johnsonville, Tenn., for production of lithium alkyls. The plant will have an annual capacity of 100,000 lb of n-Butyl lithium and will be readily expandable to twice that size.

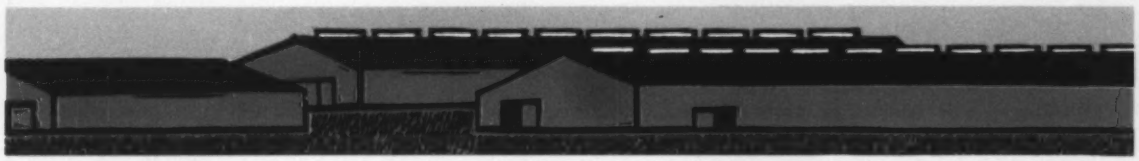
H. M. Harper Co., Morton Grove, Ill., opened a warehouse for nonferrous and stainless steel fasteners at 2615 S. Hanley Rd., St. Louis 17, Mo.

Allis-Chalmers Mfg. Co., Milwaukee, received a $10,760,370 contract from the Atomic Energy Commission to build a nuclear powerplant in Los Angeles County, California. The steam generators and nonnuclear portions of the plant (estimated to cost about $11 million) will be provided by Los Angeles and Pasadena, Calif., under the AEC plan.

Pipe Line Service Corp., Franklin Park, Ill., a subsidiary of American Steel Foundries, Chicago, is constructing a steel pipe coating and wrapping plant in Youngstown. The 94,000 sq ft facility will be completed in April, 1961. It will have a coating capacity of about 1500 carloads annually.

Marsh Instrument Co., a division of Colorado Oil & Gas Corp., Skokie, Ill., is now operating its warehousing and distributing facilities at Ft. Lee, N. J. The firm's products include pressure gages, dial thermometers, valves, refrigeration equipment, and heating specialties.

RISING FAST IN MID-AMERICA—
MIDWEST STEEL CORPORATION



Above, with the big "M" in it, you see the trademark of Midwest Steel Corporation, a new division of National Steel Corporation, now nearing completion in the heart of the metalworking industry of Mid-America.

It stands for a new, ultra-modern flat-rolled products plant—the most efficient and advanced in the country—soon to swing into operation on the Indiana shore of Lake Michigan.

It stands for a new look in steel plants, for handsome, green buildings and grounds . . . clean and well cared for.

It stands for new standards in steel products and for the finest steels: electrolytic tin plate, galvanized coils and sheets, hot- and cold-rolled sheets.

It stands for outstanding service, for new and economical solutions to your problems, for expert assistance whenever you need it.

It stands for a direct pipeline from our door to yours via waterways, railroads and highways.

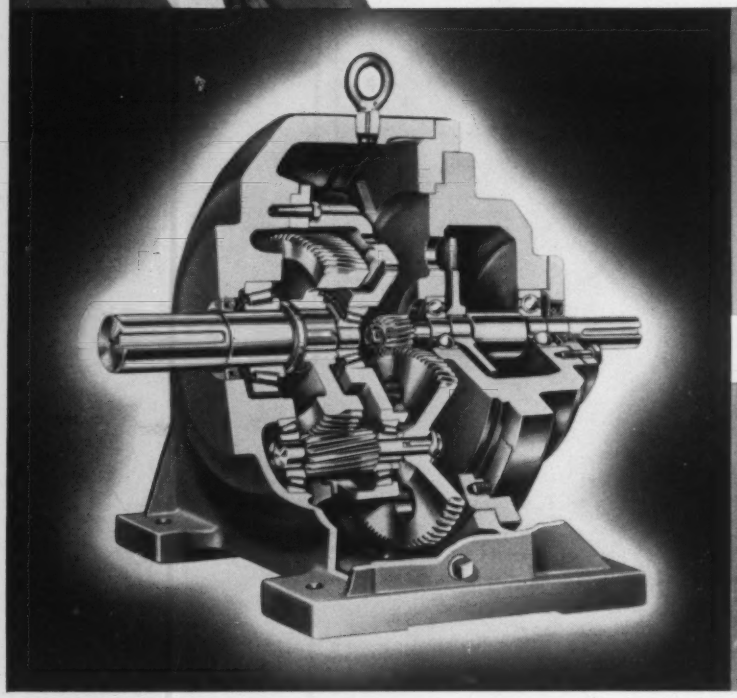
Early in 1961, we'll be ready to roll. And the vast metalworking area ringing Chicago will have a new supply of quality steel on its doorstep. Midwest Steel will be in business, producing more muscle for Mid-America.

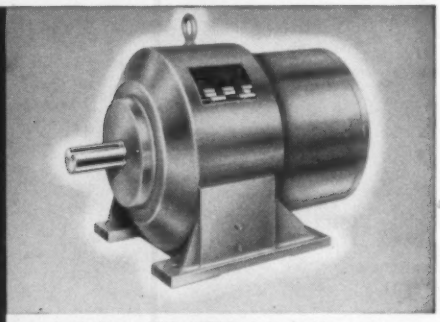
MIDWEST STEEL
Portage, Indiana

Midwest Steel is a division of **NATIONAL STEEL CORPORATION**

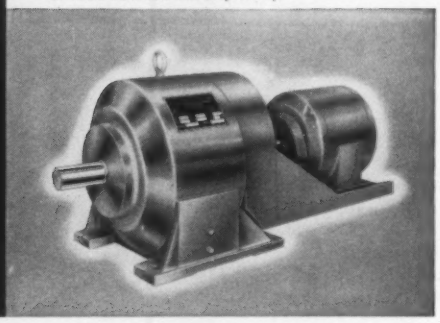
"Buying at Philadelphia Gear, I get the benefit of this simple formula..."

IMPROVED GEARS = [LONGER LIFE / MORE POWER]





Available as "IN-LINE" Reducer (left), or as a GearMotoR with flange mounted motor (above) or foot mounted motor (below).



The gearing in these drives is case hardened and precision ground, an advanced development that out-dates conventional standards and ratings. You get commercial drives with gearing of master gear quality at a cost no greater than conventional drives now in use. They are available in standard sizes to 200 H.P.

LONGER LIFE
Extreme accuracy of tooth profiles, profile spacing and surface furnish eliminates "running-in" wear.

MORE POWER
Harder materials, plus reduced load factors means the reducer can transmit more power, operate at higher speeds.

SPACE AND WEIGHT SAVINGS
Reduced load factors also mean less space and weight without sacrificing performance characteristics.

REDUCED VIBRATION
Reduced tooth to tooth errors, accumulated pitch errors and total composite errors give smoother contact.

REDUCED SOUND LEVELS
For applications where low sound levels are important, gear noise is no longer a controlling factor.

FOR MORE INFORMATION
Send for our new Catalogs R-60 (IN-LINE Reducers) and GM-60 (GearMotoRs).

philadelphia gear drives

PHILADELPHIA GEAR CORPORATION
King of Prussia (Suburban Philadelphia), Pennsylvania

Technical Outlook

LEAPING ELECTRON BEAMS— Latest welding tool, electron beams, will eventually be able to join difficult metals at 300 ipm, predicts J. B. Merrill, president, High Vacuum Equipment Corp., a subsidiary of Robinson Technical Products Inc., Hingham, Mass. Current speeds are still well below 100 ipm, experts claim.

CRYSTAL GAZING— In your future: Pocket radiotelephones that will permit you to communicate with anyone, anywhere; world-wide TV; machine to machine communication (interplant or intraplant) over the regular telephone network.

COATING REVIVES REJECTS— By applying a chemical coating (Nicrocoat) originally designed for corrosion protection, a valve manufacturer saved 90 per cent of a rejected batch of cast, stainless steel, aircraft valves. Porosity was too severe for conventional impregnation techniques, says Wall Colmonoy Corp., Detroit.

SULFUR REMOVAL— British research people have found an electrolytic method of producing iron with 0.0005 per cent sulfur, starting with material which has a sulfur content of 0.0095 per cent.

OPPOSITE MAGNETISM— A compound called chromium manganese antimonide has on again, off again magnetic qualities, claims the discoverer: Central Research Dept., E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. It says the compound is nonmagnetic below a certain temperature, which can be varied by changing chromium content. The magnetic relationship to temperature is opposite that of iron.

WON'T STAY DOWN— Latest report on anthracite interests' efforts to regain lost markets includes these new uses: 1. Anthracite fines are preferred fluxing agents in sintering and pelletizing ore for blast furnace charges (Bethlehem Steel Co.). 2. To replace diminishing coke breeze supplies, steel people may have to turn to semi-anthracites. 3. Heat treatment of anthracite makes it an acceptable carbon for some uses in aluminum smelting (Aluminium Laboratories Ltd., Canada). 4. Metallurgical briquets with a high percentage of anthracite are more resistant to impact and abrasion than premium cokes (Bureau of Mines).

ARTIFICIAL AUDITORIUM— A new electronic technique called colorless reverberation can improve the reverberation characteristics of any area to give the effect of a real concert hall. The method is being tested by Bell Laboratories, Murray Hill, N. J. The "colorless" term describes the flat, equal response to all frequencies by equipment.

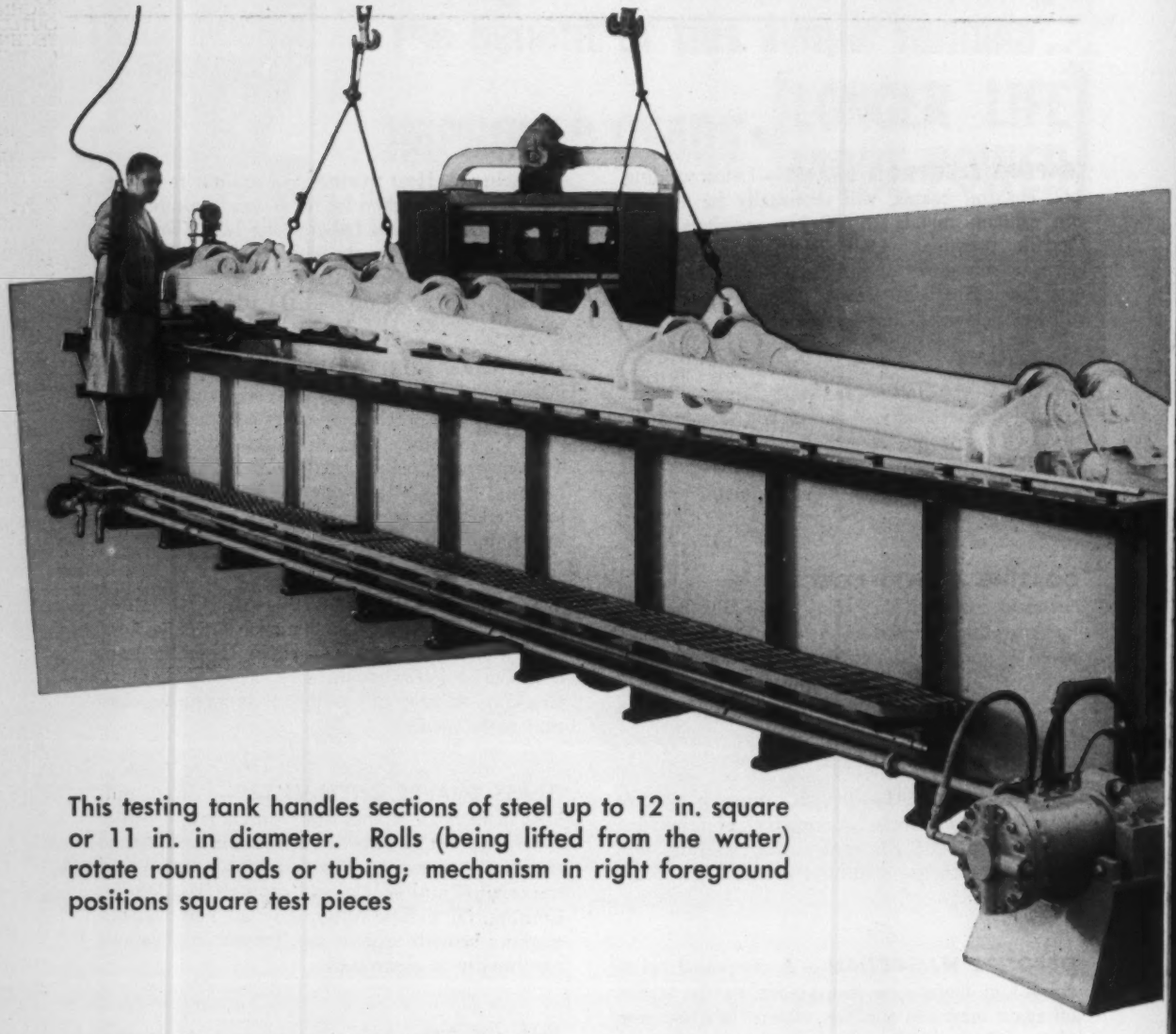
WELDING STUDY STARTED— A $45,000 study of the welding of iron and nickel base alloys for space vehicles has been started by Republic Aviation Corp., Farmingdale, N. Y. Main problem: Cracking. Already in progress: A program on electron beam welding.

GLASS SHAPES CHEM-MILLED— Sharp outlines of intricate shapes can be photographed into a new type of glass called Fotoceram and etched chemically to within plus or minus 0.0015 in. of the original outline, claims Corning Glass Works, Corning, N. Y. The future may see many metalworking benefits, experts say. Present applications run heavily to electronics.

THE BIG EYE— Infrared detectors in Midas surveillance satellites can pick up the heat radiating from a missile engine seconds after launching. It gives us a 30 minute warning before an ICBM could arrive, states Aerojet-General Corp., a subsidiary of General Tire & Rubber Co., Azusa, Calif.

POSITION DETECTOR— A new device detects 0.0001 in. increments of shaft rotation at speeds up to 120 ipm without physical contact. Called a position transducer, the instrument is compact, reliable, and practically wearfree, claims Electronics Div., Rheem Mfg. Co., Los Angeles.

Ultrasonic Setup Tests Heavy



This testing tank handles sections of steel up to 12 in. square or 11 in. in diameter. Rolls (being lifted from the water) rotate round rods or tubing; mechanism in right foreground positions square test pieces

IMMERSION ultrasonic inspection has replaced most contact testing methods at the Steel & Tube Div., Timken Roller Bearing Co., Canton, Ohio.

The method is said to make for faster, less expensive inspection of forging squares, round bars, and large, seamless, steel tubing. Better product uniformity and reliability are also reported.

A 30 ft testing tank, designed by the company's engineers, handles sections up to 12 in. square or 11 in. in diameter.

• The ultrasonic equipment can be used for contact or immersion testing, but underwater operation is faster and increases crystal life.

The instrument can do contact or immersion inspection at 0.5 to 25 megacycles. But in the immersion method, the search unit is separated from the test surface by a column of water, and no special surface preparation is necessary. Previously, when the contact method was used, a thin film of oil or glycerine had to be brushed on the test surface to serve as a coupling medium.

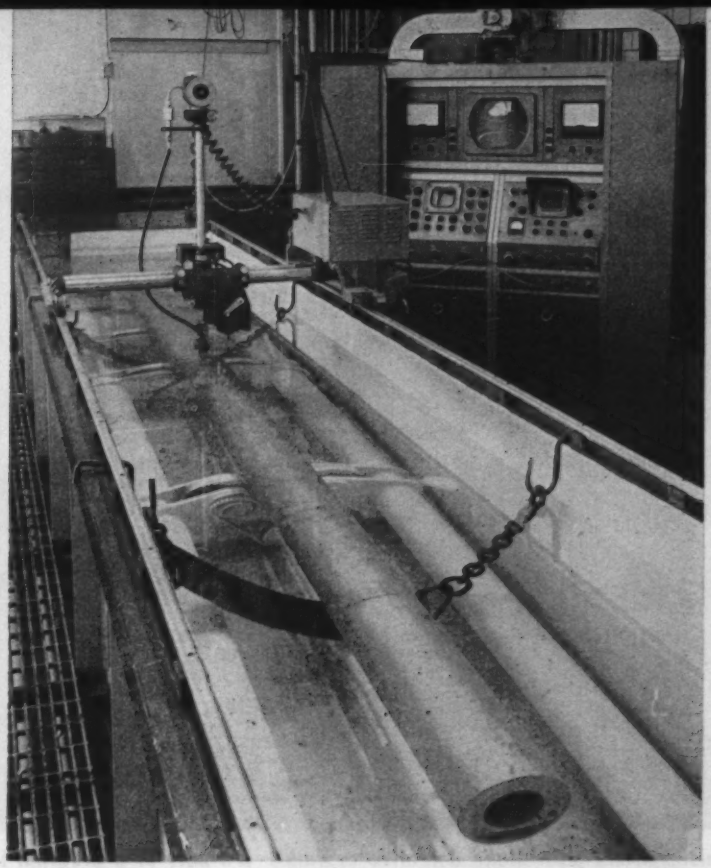
Immersion is said to make the search unit more sensitive, to permit use of higher frequency crystals, and to eliminate crystal wear.

• Round bars and seamless tubing are rotated as the search unit travels the length of the tank.

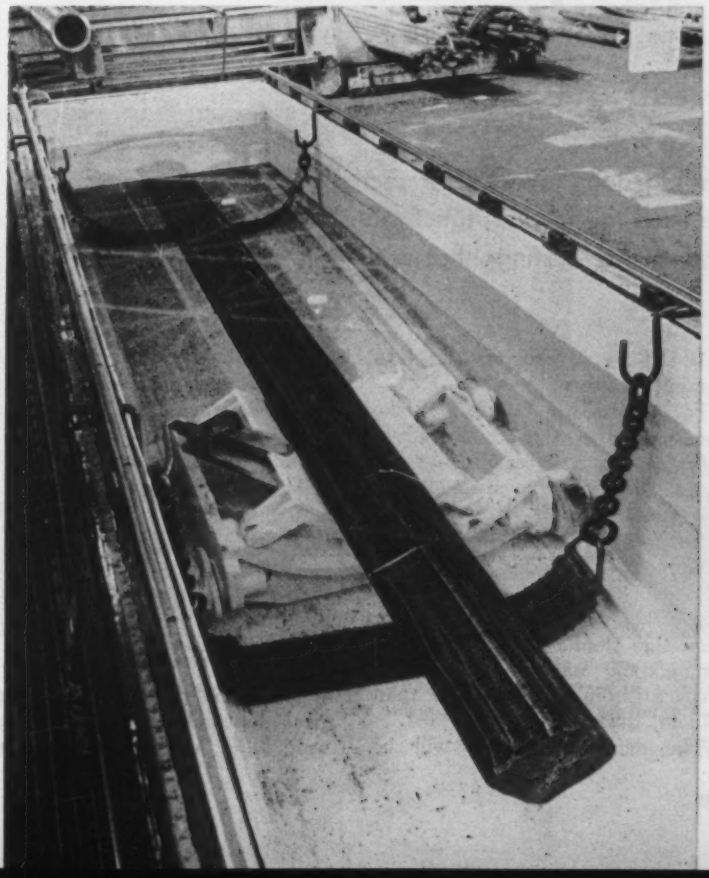
The positioner, traveling on rails at the top of the tank, is controlled by an operator who constantly watches an oscilloscope screen for defect signals. Rounds are rotated by power driven rolls as the positioner moves along its track. That produces a helical scan path and insures complete, uniform coverage.

The scan spiral is controlled by adjustment of positioner travel and

Sections



Heavy seamless tubing (above) is rotated while the search unit positioner moves on rails at the top of the testing tank. That produces a spiral scan path and insures uniform coverage. Below: Square section of steel is centered in the ultrasonic inspection bath on V-shaped saddles

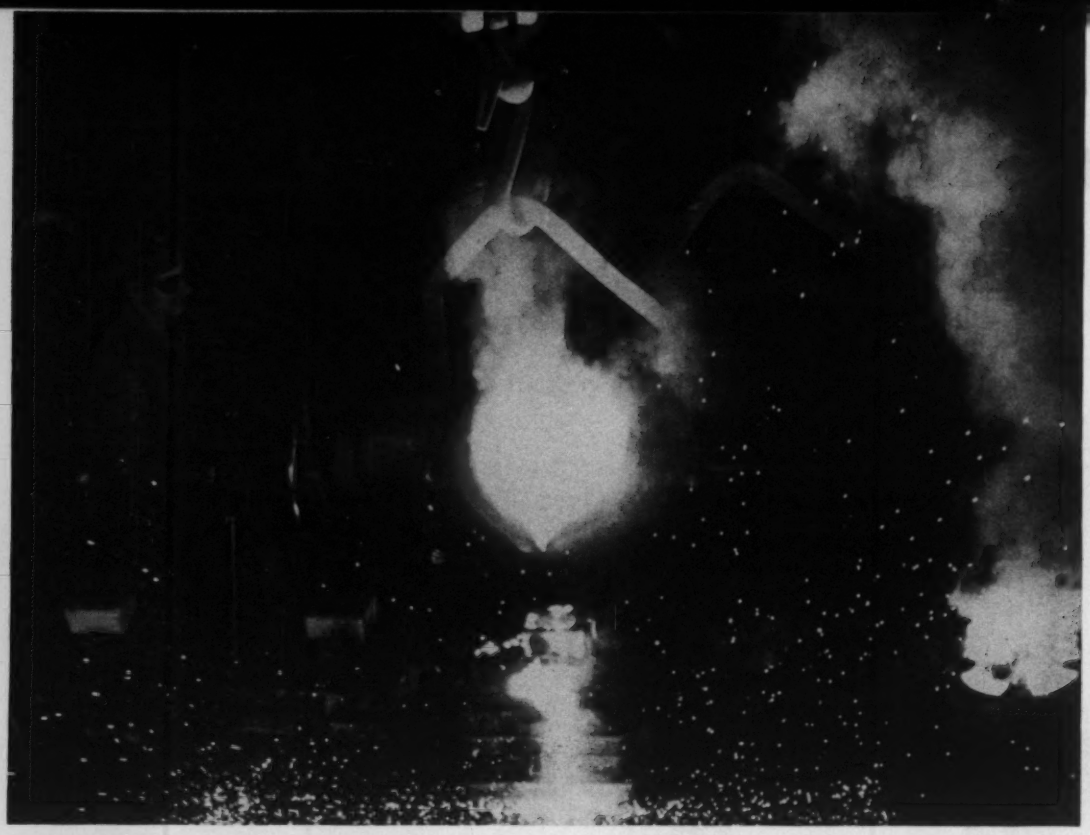


roll rotation speeds. The operator can control the positioner for close investigation of questionable areas.

• Squares are scanned in a preset grid pattern generated by limit switches at travel extremes.

Sections are centered in the tank by two, V-shaped saddles. The fixed saddle at one end can be rotated 90 degrees by an air cylinder and cam. The other saddle follows that motion.

After loading, the square is turned so one surface is horizontal for testing. The four sides are inspected successively.



This pourer's job: Make defective castings. It's part of a program in which the . . .

Navy Will Set New Casting Standards

Radiographs tailored for sections 0.10 to 0.75 in. thick will be used to set acceptance standards for high quality aircraft and missile castings that are made of steel

THE PATH of progress can take unexpected turns.

For example: American Brake Shoe Co. has a contract to produce *defective* castings because technological advances have created a new problem.

Progress made in the casting of light steel sections for aircraft and missiles (some design and fabrication problems were solved) made inspection standards obsolete. Some radiographic standards used were prepared from sections more than 0.75 in. thick.

The defective castings will be used by the Naval Ordnance Laboratory, Silver Spring, Md., to prepare a set of reference radiographs that illustrate the most common defects.

The radiographs will be used in a manual the lab is preparing for the Bureau of Naval Weapons. The program is being co-ordinated with the American Society for Testing Materials and the Aerospace Industries Association.

• American Brake Shoe's Metallurgical Research Laboratory, Mahwah, N. J., will produce the castings. Radiographs will be for sections 0.13 to 0.75 in. thick.

These compositions will be cast: 4130, 4140, 4330 or 4340, 347, 410 or 430, and Armco 17-4 PH. Defects sought will be inclusions, cold shuts, shrinkage, cracks, gas holes, hot tears, and misruns.

Each casting must contain only one defect, and each radiographic illustration must clearly identify the shape and size of the flaw. In most cases, radiographs will be made to display the defect in progressively increasing severity.

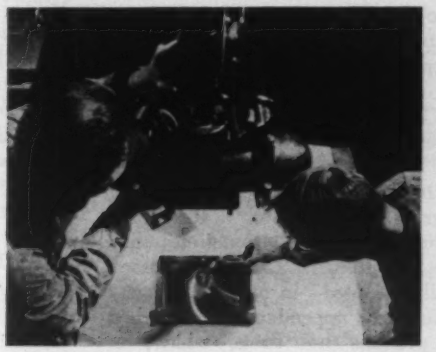
• The Naval Ordnance Laboratory drew up the specifications for the casting procedure.

All parts must be made by methods commonly used in the production of aircraft castings. Ceramic molds are called for. The labora-

R. J. Ely (left) and project engineer "design" a pattern to produce varying degrees of soundness in a test casting. By comparing defects shown in earlier radiographs with the test castings (foreground), they can produce a specified degree of defect in next series of castings. In this case, they are controlling internal shrinkage by the size and shape of the tiny, silver-colored appendages that the engineer is arranging on the pattern board and by modifying the risering on the mold

Tip on Light Castings

The product designer has a great deal to say about the quality of a casting, advise research specialists at American Brake Shoe's Mahwah, N. J., Research Center. In their search for defects in steel castings, they conclude: "The most critical factor in design is to produce true directional solidification, which, in turn, eliminates shrinkage."



X-ray equipment is positioned over the test casting to record the defects. Finished radiographic reference views will be 2 by 2¾ in.

In the darkroom, the final radiographs are inspected and compared to make sure that all desired types of flaws are represented and that degrees of severity are adequately shown on the negatives

(*Please turn to Page* 108)

tory also specified the dimensions of the cast samples (6 by 8 in.) and picked the alloy compositions. The requirements were based on suggestions offered by airframe contractors.

R. J. Ely, assistant chief metallurgist at American Brake Shoe's lab, gives this illustration of the care required: "We melt 240 lb heats of 4330 steel in a basic lined, induction furnace. Ferromanganese and ferrosilicon are added following melt down, and the heats are killed with calcium-manganese-silicon and aluminum added at tap. The ladles are basic. Metal is poured at 2900 to 3150° F into ceramic molds. They minimize surface defects which might be detrimental in obtaining proper radiographs."

• Controlling the foundry variables is tricky business.

The plates are cast with and without taper to produce varying degrees of soundness. Risers are varied in size, and sometimes they are eliminated. In some cases, chills are used—in others, a variety of localized appendages are attached to produce hot spots, which, in turn, generate changing conditions of internal shrinkage.

Mold and metal temperatures are also varied.

The experts at American Brake Shoe figure they may have to make as many as 240 test castings to get the required number of standards. Final size of the reference radiographs will be only 2 by 2¾ in., so it is sometimes possible to get more than a single usable x-ray from one test plate.

The program will get more difficult as it goes along. Initially, a number of flaws are needed, so it's not too tough to find some portion of a test plate that has a specified defect.

As more and more slots are filled, the metallurgists must search for degrees of flaws.

At first, the reference manual will apply to the aircraft and missile industry, helping the designer, engineer, producer, and consumer get the assured performance they need from the castings. As in the case of today's radiographic standards for thicker sections, the Navy's standards may eventually be adopted by the casting industry.

Space Age Material Solves Mundane Problems Too

Titanium diboride produced in 100 and 260 lb cylinders lends itself to such uses as milling media, cutting tools, shear blades, as well as for bearings in jet and rocket engines

WITH introduction of titanium diboride shapes of "unprecedented" strength, size, and purity, National Carbon Co., a division of Union Carbide Corp., New York, has entered the field of high temperature, refractory compounds.

The material maintains a flexural strength of 35,000 psi over a temperature range of 77 through 3632° F.

That makes it the strongest known at elevated temperatures, the company says.

Cylinders have been produced in these sizes: 6 in. in diameter, 20 in. long, weighing 100 lb; and 14 in. in diameter, 10 in. long, weighing 260 lb.

Production techniques have resulted in titanium diboride of extremely fine and uniform particle size and with a purity as high as 99.5 per cent. Shapes have been produced with as high as 99 per cent of theoretical density.

• Numerous possible uses of the material have been suggested by the company:

Lightweight ball and roller bearings for equipment such as jet and rocket engines. That's because of titanium boride's high strength, its high modulus of elasticity similar to ceramic materials, and because its weight is about half that of stainless steel and only about 12 per cent greater than alumina.

Milling media. Hardness is 3300 Kg/mm² Knoop, which puts it in the range of boron carbide, long regarded as the hardest manmade material.

Cutting tools for machining hard metals at high speeds. Fabricated titanium diboride itself is virtually unmachinable except with diamond tools, but intricate shapes can be machined with conventional tools during processing stages.

Shear blades for cutting rubber or plastics containing abrasive fillers.

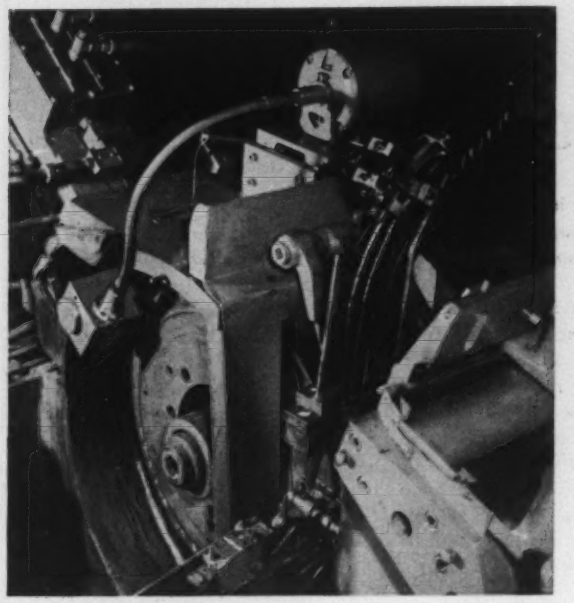
Abrasion resistant surfaces such as wear plates, knife edges, sandblasting and shotblasting nozzles, metal spraying equipment, and dies for wire drawing.

Crucibles, pumps, tapping spouts, funnel linings, valves and gates for nonferrous metals (especially aluminum). That's because titanium diboride has excellent oxidation resistance at temperatures as high as 1832° F and a relatively low oxidation rate even at 2552° F, is inert to molten aluminum, zinc, and slags, but is not resistant to molten ferrous metals.

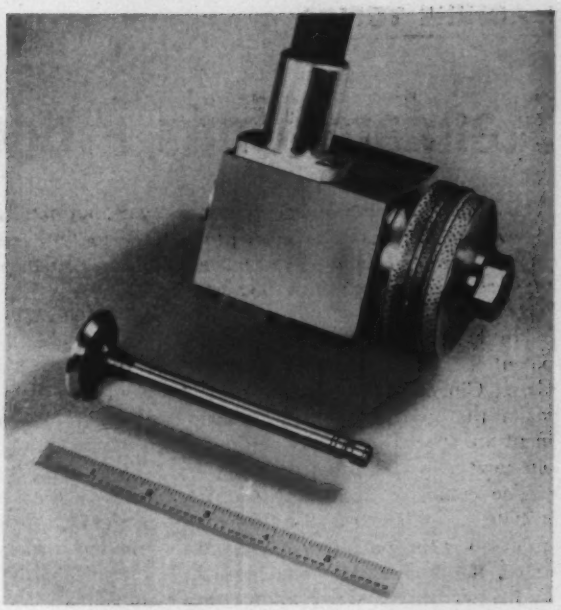
Cylinders as lead-in connections to cells used in aluminum production. That's because electrical resistivity of titanium diboride is the lowest of any ever reported (20 to 30 micro-ohm cm at 68° F, and 80 to 100 micro-ohm cm at 1832° F), says National Carbon.

• Other properties may suggest other uses in the metalworking industry.

The material has an elastic modulus of 60 x 10^6 from 77 through 1832° F. Coefficient of thermal expansion is 2.5 x 10^{-6} cm/cm from 77 to 392° F, and 8.1 x 10^{-6} cm/cm from 77 to 2372° F. Thermal conductivity at room temperature is 0.06 Cal/cm²-/sec/cm/° C; at 2732° F thermal conductivity is 0.10.



Rotary diamond dressing tool is connected to its power source with a flexible cable. Head mounts on a standard cross slide



Diamonds are matrixed in a small wheel which rotates rapidly during dressing traverse. Improved wheel dressing has cut valve grinding rejects

Wheel Dressing Technique Upgrades Part Quality

Rotary diamond method is used between the ejection of one part and the in-feeding of the next. Ford reports reduction in rejects, longer wheel life, savings in labor costs

PRODUCT quality has been maintained at consistently higher levels since the switch has been made to rotary diamond dressing of grinding wheels, report engineers at the Northville (Mich.) plant of Ford Motor Co.

Additional benefits include longer grinding wheel life, reduced diamond dressing tool costs, and savings in labor costs.

The plant supplies a major portion of Ford's intake and exhaust valves. Grinding is its most important operation.

Three, No. 2, Cincinnati centerless grinders and three, No. 12½, Landis centerless grinders have been converted to use the Tru-Grit rotary diamond tools made by Wheel Trueing Tool Co., Detroit.

• One previous cause of part variation was the continuation of production during the dressing of the grinding wheel. Result: Relatively high scrap losses.

With the Tru-Grit method, a powered rotary tool plunges straight against the wheel and dresses the entire face in one pass. The operation takes place between the ejection of one part and in-feeding of the next.

• Diamond tool cost per part has declined more than 40 per cent and may go even lower.

The original cost analysis was based on 1 million parts per tool, but production passed that figure with the original rotary tool still in service.

Among the first machines to be converted to rotary dressing was a No. 12½, Landis centerless grinder. A Norton, 24 x 18 x 0.625 in. grinding wheel is used to grind the keeper groove and chamfer on the foot of an intake valve stem.

Before the conversion, a single wheel ground about 32,000 parts before it was worn out. With the present technique, the average is more than 136,000 parts, and less time is required for setup and maintenance.

• In another setup, dressing is done in 2½ seconds (between parts) vs. 1 minute before.

The machine (a No. 2, Cincinnati centerless grinder) was revamped to accommodate two grinding wheels, and the electrical and hydraulic circuitry was altered to accept the dressing tools. A single composite rotary unit was designed to dress both grinding wheels simultaneously.

With a product modification, production was almost doubled; quality and part uniformity were improved. The unit grinds two spaced grooves and a chamfer in exhaust valves.

Standard Units Produce for Market Test

WHEN your designers come up with a new product that has mass production potential, how do you make the first runs needed to test the market?

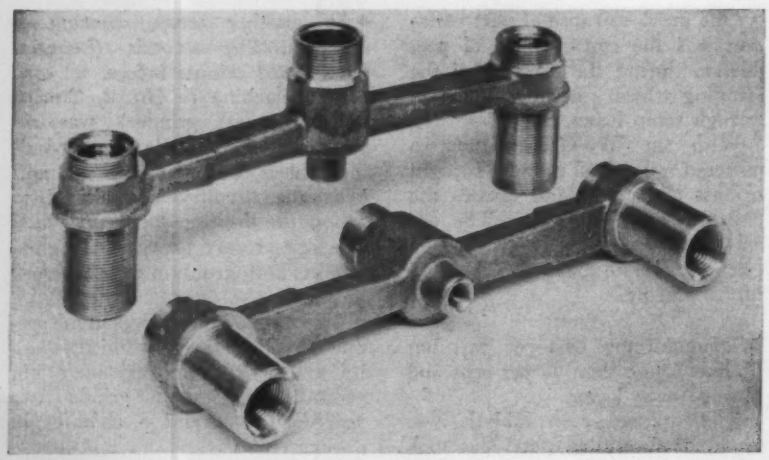
Until some measure of market potential was available, Bardes Corp., Cincinnati, was reluctant to make the necessary heavy investment in special machines to turn out new sink faucet bodies.

The company decided it should initiate a market exploration program to gage potential sales and asked its production staff, headed by Milton Garvin, vice president, to work out details of a manufacturing line for low cost, small lot production for that purpose.

• Production's answer: Specially tooled standard machine tools.

A total of 11 different faucet models had to be machined. The objective was to provide one manufacturing setup that would handle all models in sufficient quantity while holding unit costs down. One of the faucet bodies involved 30 operations, including drilling, hollow milling, boring, tapping, and die threading.

This ten spindle line of standard, 21 in., drilling machines is turning out first runs of 11 different faucet bodies. Unit costs are held down, and production rates are high enough to provide parts for market testing



The job is done on four standard, 21 in., sliding head drills made by Cincinnati Lathe & Tool Co., Cincinnati. One is a four spindle model. The other three have two spindles each. Total investment for the "line" was about $27,500.

Faucet bodies, free machining brass castings, are completed at production rates from 125 to 200 parts an hour, depending on the part complexity.

• Operations can be shifted to a transfer machine for high volume if the market test with low volume production proves successful.

Mr. Garvin comments: "The setup is ideal for the job we had to do. In addition to our comparatively low capital investment, we effect other advantages including lower cost tooling on each faucet model, simple and relatively inexpensive holding fixtures, fast changeover, and low-cost setup."

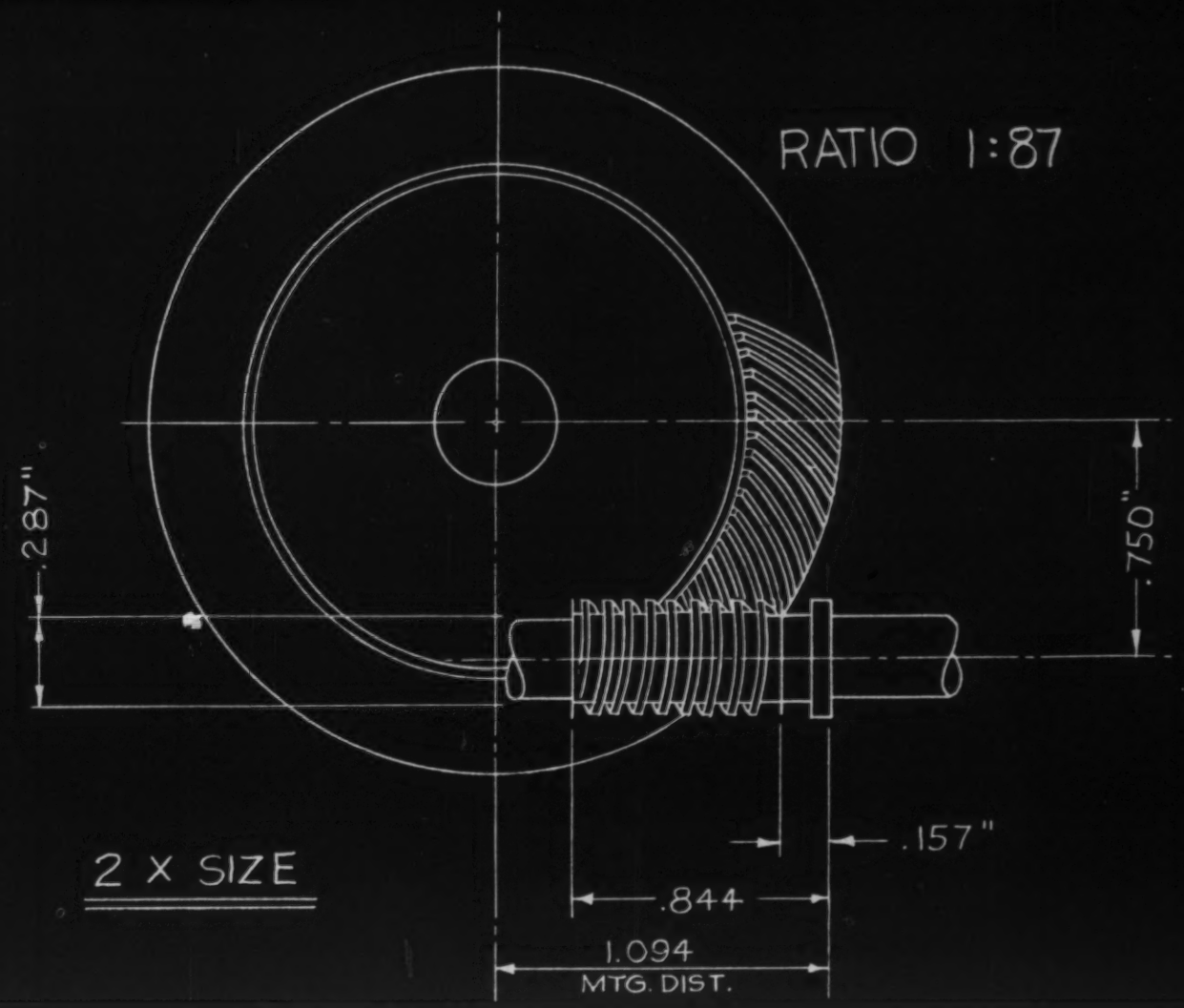
When the low volume job is finished, the machines are to be used on other work, including development of other new products and for testing transfer line tooling.

Machine Tool Orders

Makers of metal cutting machines want to forget October, but it was the best month of the year for producers of metal forming equipment.

The National Machine Tool Builders' Association figures for the month show the metal cutting group's net orders at $35,550,000 (vs. $42,150,000 in September). As anticipated (STEEL, Nov. 21, p. 104), heavy cancellations (about $8 million) played havoc with an already light sales month. Domestic gross orders rose about $2 million over September's, but foreign orders slumped from $17 million to only $9.5 million.

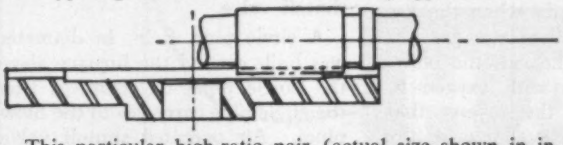
Net orders for metal forming machines hit $20.4 million. The increase can be credited solely to improved domestic business. April is next in rank—net sales then were just over $15 million.



HERE'S ANOTHER GEAR GLEASON BUILT FROM FIRST DESIGN TO FINAL PRODUCT

This is the finished prototype of a new high-ratio hypoid gear. Our customer will now produce it, royalty free, on his Gleason equipment.

This is but one example of what Gleason engineering service can do for people who need gears. Our facilities and advice are at your constant disposal for development of bevel and hypoid gears to meet the needs of any application.



This particular high-ratio pair (actual size shown in insert) offers several advantages over conventional gears:

GREATER STRENGTH. High-ratio hypoid pinions are larger and stronger than corresponding bevel pinions.

COMPACTNESS. Where space is a problem, the high-offset principle lets you design a more compact and flexible unit than the corresponding worm and wheel.

SMOOTHER ACTION. High-offset pairs provide smooth, quiet tooth action . . . *continuous* action even with only one or two teeth, because of the way the teeth wrap around the pinion.

STRADDLE MOUNTINGS. Cylindrical high-ratio pinions, with extended shank, make practical very rigid straddle mountings.

GRINDING. High reduction hypoids are cut on same Gleason equipment used on familiar bevel and hypoid gears. Same testers, quenchers and other auxiliary equipment can be used. Grinders are available for the ultimate in precision and finish to minimize friction.

LET GLEASON MAKE RECOMMENDATIONS. Send along a set of prints, and we'll be glad to study them and give you our thoughts on how best to make the gears you need.

GLEASON WORKS

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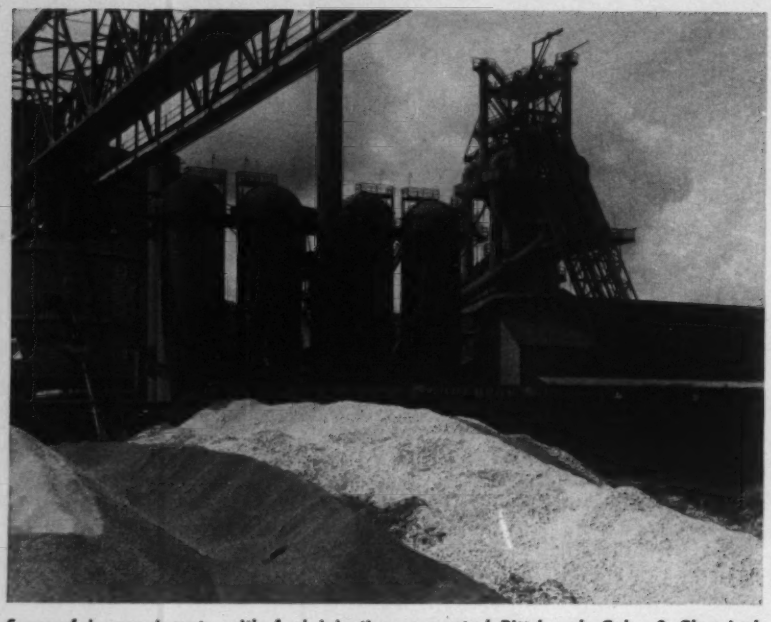


Successful experiments with fuel injection prompted Pittsburgh Coke & Chemical to use gas in this blast furnace for production runs of iron and spiegeleisen

Fuel Injection Increases Blast Furnace Iron Output

Addition of combustibles to the air stream permits use of hotter blast (increasing hearth temperatures). It also cuts coke rate and speeds reduction of the ore

MORE blast furnace operators are injecting materials in the air stream for smoother furnace operation and increased output of iron and ferroalloys.

Steam is used in most of the stacks to give the burden better fluidity and reduce hangups. Oxygen is sometimes injected to increase temperatures in the hearth zone and speed the reduction of the ore. And combustibles are being used more generally because of their fuel and reductant values.

• Coke oven and natural gas permit use of hotter blast air, thus increasing hearth temperatures; they cut coke rate, speed ore reduction.

The gases are used in one of the stacks operated at Neville Island, Pa. (near Pittsburgh) by Pittsburgh Coke & Chemical Co.

Furnace operation is said to be changed significantly when the gas is introduced. When the gas enters the furnace through the blowpipe, it combines with oxygen in the area around the tuyere; that makes less oxygen available for the combustion of the coke. The condition led Pittsburgh Coke & Chemical to experiment with smaller coke units in the charge. By timing the start of gas injection to coincide with the arrival of the low coke burden at the bosh, the company was able to restore the desired combustion balance.

"Use of coke oven or natural gas permits smooth furnace operation at the highest temperatures the stoves can take," says C. T. Marshall, vice president of the company's Coke & Iron Div. "Even if the furnace is using beneficiated burden, such as pellets or sinter—with a coke rate of 1100 lb—coke in the bosh may not generate enough gas to reduce the ore. In that case, gas through the tuyeres is more important because it supplies heat and enriches the reducing environment."

Coke oven gas was used in the furnace at first because it was available as a byproduct from the company's ovens and because it contains a high percentage of hydrogen—said to be a superior reducing agent. The company would have continued to use coke oven gas, but when the supply ran short, natural gas was piped in to keep the stack on the new practice.

Gas injection is also used on production runs of iron and spiegeleisen.

• Gas is piped from storage to a compressor station, then into the blast furnace tuyeres.

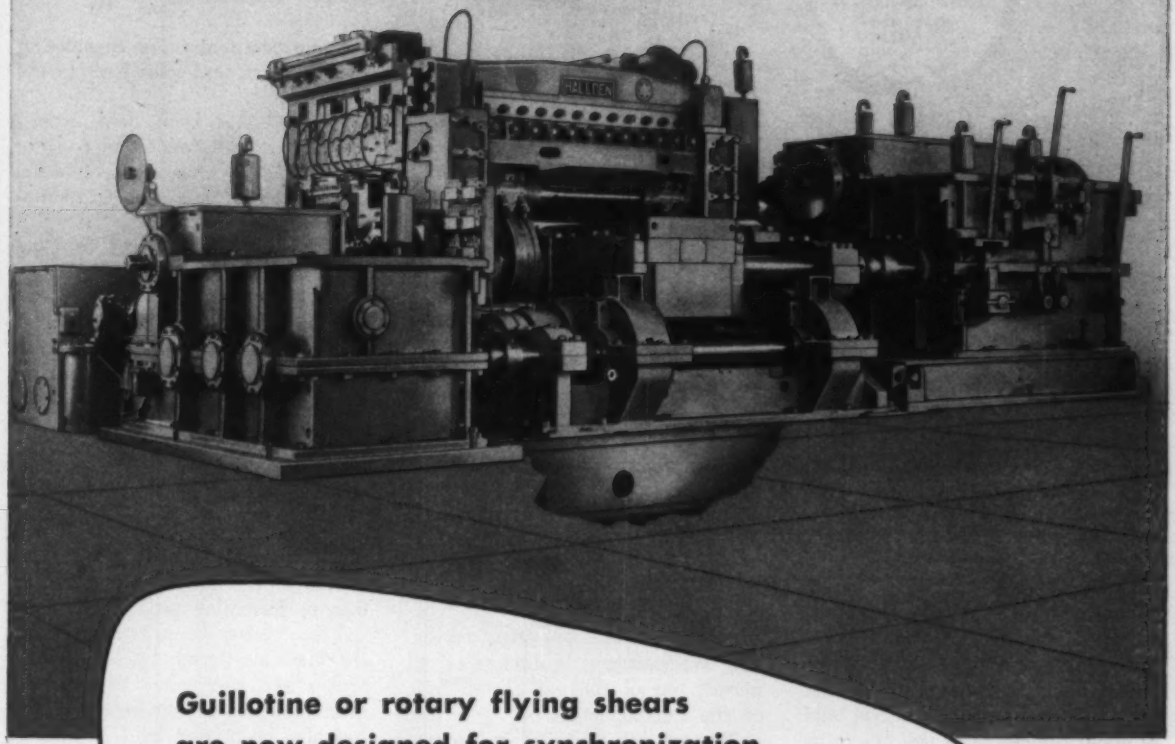
A compressor station that was used to deliver gas to a utility company compresses gas for the stack. It is fed by a 5 million cu ft gas holder. Gas passes from the compressors through a tank that absorbs pulsations and insures smooth flow into the tuyeres.

A manually set, recording controller in the pyrometer room meters fuel into the air stream through an air operated flow control valve. Automatic proportioning of the gas and blast air wasn't provided for in the original setup, but it would be desirable in a production installation. Gas flow can be stopped by an air operated, safety shutoff valve.

A circle pipe, 6 in. in diameter, was built around the furnace above the bustle pipe; 12 downlegs from the circle pipe carry gas to the blowpipes. Air operated shutoff valves are included on each of the downlegs as a precautionary measure. Orifice plates on the downlegs permit the use of manometers to balance flow between the tuyeres.

Face plates on the tuyere stock elbows were modified, so the lance gland and peep sight could be

SYNCHRONIZED "On the Fly"



Guillotine or rotary flying shears are now designed for synchronization adjustment without stopping the machine.

Automatic Shears

designed and built by

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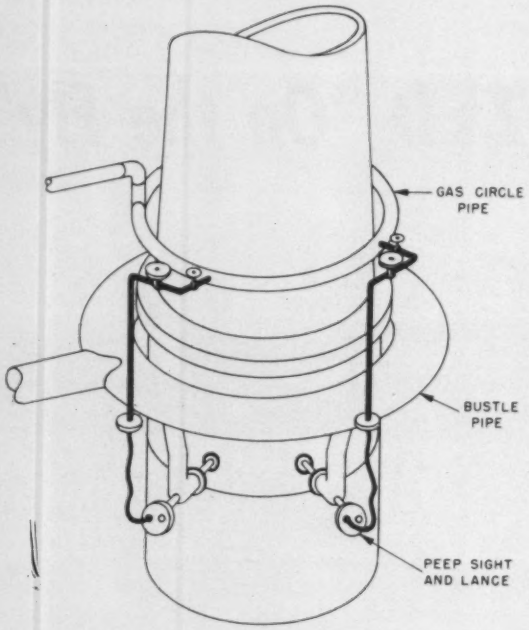


Gaseous fuel from the circle pipe is carried into the bosh by stainless steel lances mounted inside the blowpipes

mounted on the horizontal center line of the tuyere. The tip of the lance is set back about 4 in. from the tuyere nose; each lance is held at about the center of the tuyere by a chair—a short section of pipe welded to the lance.

• Several operators are injecting gaseous fuels through the tuyeres, experimentally or on production runs.

One operator credits gas injection with a 200 to 300 lb reduction in the coke required per ton of iron, or a saving of about $2 per ton of iron. The practice also increases iron output 12 to 15 per cent, makes for a saving on capital and other fixed costs, and permits closer control of silicon content in the iron.

Reduced coke rates have also been reported by Armco Steel Corp. through the injection of natural gas and coke oven gas in the air stream.

Use of natural gas has been under development at the Pueblo (Colo.) plant of Colorado Fuel & Iron Corp. for nearly two years, a company official says. Gas injection has been practiced on one of the furnaces for more than a year, and construction is underway to permit use of the gas on all four of the Pueblo stacks.

Natural gas injection is also reported by McLouth Steel Corp., Detroit, and it has been tried experimentally by United States Steel Corp. The gas was injected experimentally at three of the tuyeres on one furnace by Kaiser Steel Corp. In the next six months, Kaiser expects to adapt all tuyeres on that furnace to natural gas injection and hopes to reduce the coke rate as much as 200 lb.

• Gas injection has led to changes in blowpipe and tuyere design.

Injection of the gas through the blowpipes has been beneficial to furnace operation, says a Colorado Fuel & Iron official, but the blowpipes must be protected against extremely high temperatures. The company is experimenting with special tuyeres.

Engineers at Pittsburgh Coke & Chemical have also been experimenting with insulated blowpipes and with a gas line that passes through the insulating jacket on the blowpipe, leaving only a short length of the lance exposed to the heat in the tuyere area. Such a design will provide additional cooling for the blowpipe and preheat the gases before they are injected, says E. R. Dean, assistant general superintendent of the company's Coke & Iron Div.

• Some companies are considering the use of oil and solid fuels in the air stream.

Fuel oil has been used experimentally at Colorado Fuel & Iron; bunker C oil has been injected by U. S. Steel. Use of experimental oil injection is planned late this year at Dominion Steel & Coal Corp. Ltd., Montreal, Que.

Fuel oil has been used experimentally in one of the stacks at Dominion Foundries & Steel Ltd., Hamilton, Ont. The company plans oil injection on a larger scale in the near future.

Solid fuels are also in use or under consideration; coke breeze has been injected in trial runs at Colorado Fuel & Iron.

• Oxygen is said to be useful in iron or ferroalloy production.

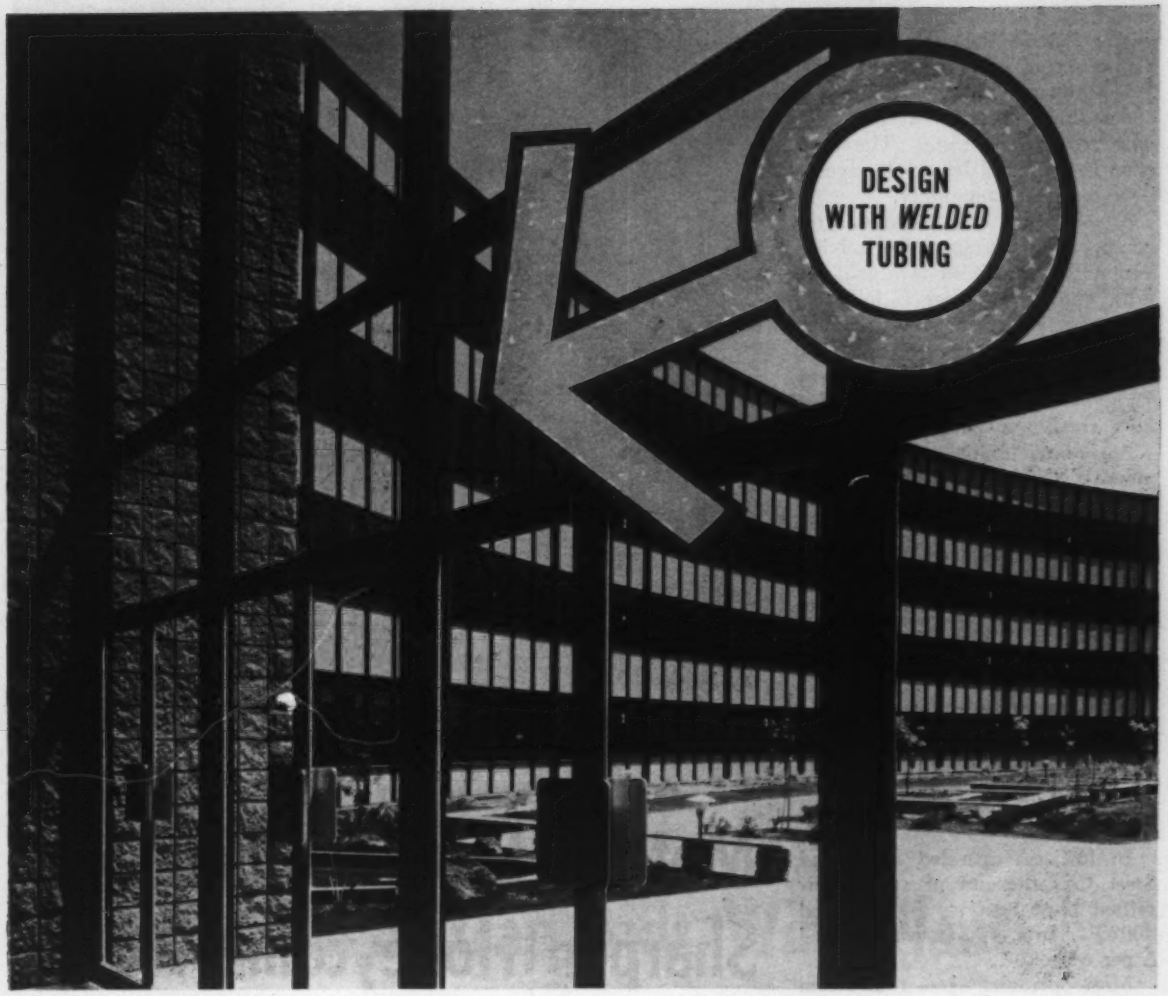
The gas has been introduced in the blast air stream by U. S. Steel and other companies to increase production of ferromanganese. It has also been used by U. S. Steel, on an experimental basis, in iron production.

Armco Steel Corp. uses oxygen for special purposes, such as hearth warmup. It has been used experimentally at McLouth, Wheeling Steel, Colorado Fuel & Iron, and Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont.

Introduction of the gas in the cold blast main was said to boost iron output and reduce coke rate slightly for Jones & Laughlin Steel Corp.

Two of the blast furnaces at Weirton Steel Co., Weirton, W. Va., a division of National Steel Corp., are using oxygen on a production basis (see STEEL, July 18, pp. 94, 96). Oxygen lines are connected to the turboblower air intakes. Oxygen content in the air is increased to about 23.9 per cent vs. 20.9 per cent in normal atmosphere.

• Natural gas, fuel oil, and oxygen



WALL COSTS CUT FOR CITY HALL WITH WELDED STEEL TUBING

Here's a sharply-defined example of welded steel tubing in today's architectural use. Because this structure was *designed with tubing in mind*, the taxpayers of San Jose, Cal. reaped a double benefit: lean, clean beauty in their city hall—tax money saved because welded steel tubing is one of the most economical structural materials available for low-rise buildings.

With round, square or rectangular tubing, large wall sections can be shop-fabricated. Window and door frames fit easily into place on the job. Tubing may be exposed for decorative value, in bright stainless or carbon steel finished as desired.

Investigate welded steel tubing as a cost-saving, eye-appealing material for schools, churches, institutions, commercial and government buildings . . . even residences. Write directly to the Formed Steel Tube Institute, or to any of the member companies listed below.

LC-601

WELDED STEEL TUBE INSTITUTE, INC.

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• Armco Steel Corp. • The Babcock & Wilcox Co., Tubular Products Div. • The Carpenter Steel Co., Alloy Tube Div. • Clayton Mark & Co. • Damascus Tube Co. • Jones & Laughlin Steel Corp., Electricweld Tube Div. • National Tube Div., United States Steel Corp. • Ohio Seamless Tube Div. of Copperweld Steel Co. • Republic Steel Corp., Steel and Tubes Div. • Revere Copper and Brass Inc., Rome Manufacturing Company Div. • Sawhill Tubular Products, Inc. • Southeastern Metals Co. • The Standard Tube Co. • Superior Tube Co. • Trent Tube Co., Subs. Crucible Steel Co. of America • Union Steel Corp. • Van Huffel Tube Corp. • Wall Tube & Metal Products Co.

have been injected with some success in Europe. Research continues.

Injection of natural gas and oxygen through adjacent orifices is under study in Italy—at the Finsider research institute. The program is sponsored by the European Coal & Steel Community.

At Societe des Acieries de Pompey, Paris, France, fuel oil injection tests produced favorable results, and the practice is followed on production runs. Tests on fuel oil injection are also being carried out at Saraing, Belgium, by Societe Anonyme Cockerill-Ougree. Results are not available.

Europeans follow two general practices in the use of fuel oil in the furnace. They may inject the fuel, in its natural state or atomized, into the furnace where heat must be supplied to vaporize and dissociate the hydrocarbons. Or the oil may be treated in a separate apparatus before it is injected.

• Most operators use steam to obtain smoother furnace operation.

Steam lines are usually connected to the hot or cold blast main (opinions differ as to which practice is better).

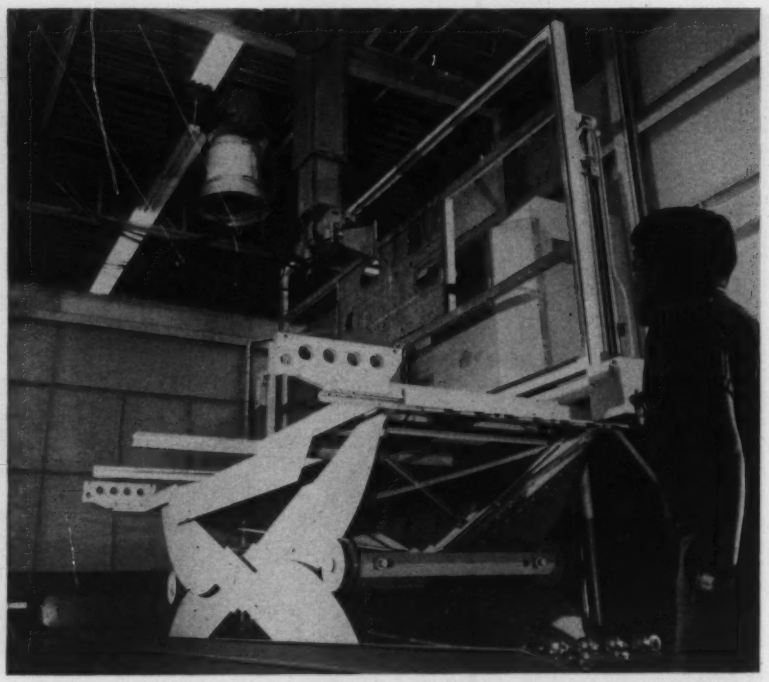
In furnaces operated by Inland Steel Co., the use of steam permitted blast heats to be increased 400° F. Iron output was boosted 5 per cent.

Most operators agree that steam injection permits increases in the furnace driving rate, especially at higher blast temperatures, and helps prevent "hanging up" of the burden. But they don't agree on what it does to coke rates. Higher coke rates are reported by some operators; others say the practice makes for lower coke consumption.

Steam injection is practiced at Woodward Iron Co., Woodward, Ala., in the production of lower phosphorus irons. It is said to give better control in the melting zone. Woodward's furnaces were designed to reduce southern hematite ores.

Some blast furnace experts say steam injection is inferior to the use of combustible materials because it doesn't contribute to fuel and reductant requirements in the hearth.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.



Scissors jack raises honeycomb panels into position between x-ray head and film room. Collimator and back and forth motion speed inspection routine

Motion, Lens Combine to Sharpen Honeycomb X-rays

A NEW X-RAY setup makes it a lot easier to detect pinholes in the brazed joints of honeycomb panels for B-70 superbombers, claim technicians at American Aviation Inc., Los Angeles.

The outsized installation features a 300,000 volt, Norelco, x-ray machine.

• Key to the successful operation of the unit is a lead shielded collimator (a kind of electronic lens). It enables North American technicians to employ an "in-motion" technique which combines accuracy and time savings.

The lens permits operators to concentrate x-rays into a rectangular x-ray pattern which can be varied in width. That changes the degree of sharpness for in-motion work. A definition of better than 2 per cent is achieved, experts claim.

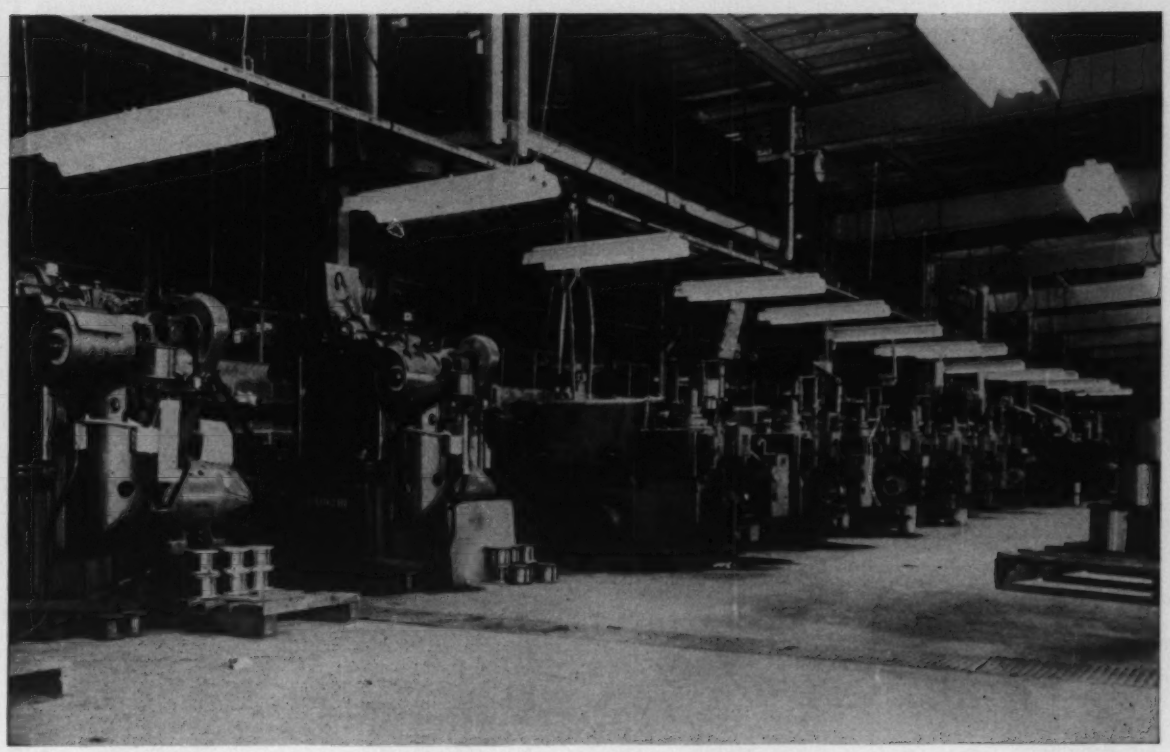
• Panels are mounted on a large fixture which moves back and forth through the x-ray beam.

Each honeycomb panel to be inspected has an x-ray film fastened to one side. The panel moves past the x-ray head with the aid of an electrically controlled frame or fixture. The collimator creates a sharp concentration or focus on only one side of the panel at a time, keeping the opposite side out of focus.

The exceptionally large honeycomb panels made it necessary for the machine to support 2000 lb in sizes up to 10 by 20 ft.

The engineers came up with a frame which can be tilted to several angles. It was mounted on a platform which is raised or lowered by a scissors-shaped hoist.

The machine and collimator were constructed by X-ray Products Co., Pico-Rivera, Calif.



Diamond dies are used exclusively in these Vaughn wire machines to draw fine wire in sizes down to 0.001 in. Stainless and nickel are alloys

Operation Bootstrap Aids Wire Plant

New equipment, installed by its own staff, and a high level of inventory for better service to customers has helped Techalloy Co. Inc. build its sales and meet foreign competition

A DO IT YOURSELF philosophy has helped a small wire redrawer build its plant investment a hundredfold in six years.

Sales in the same period have climbed beyond $3 million a year.

Techalloy Co. Inc., Rahns, Pa., started with a capitalization of $25,000 in 1954, now boasts more than $2 million worth of wire and strip equipment.

• All new equipment acquired since 1954 has been installed by the company's own staff.

A recent example was the installation of a Sendzimir mill. The company handled all phases of the job, from the trucking to plumbing and wiring. Salable strip was being produced by the mill within 60 days of its arrival at the plant.

• Next major piece of equipment planned for the plant: A vacuum annealing furnace.

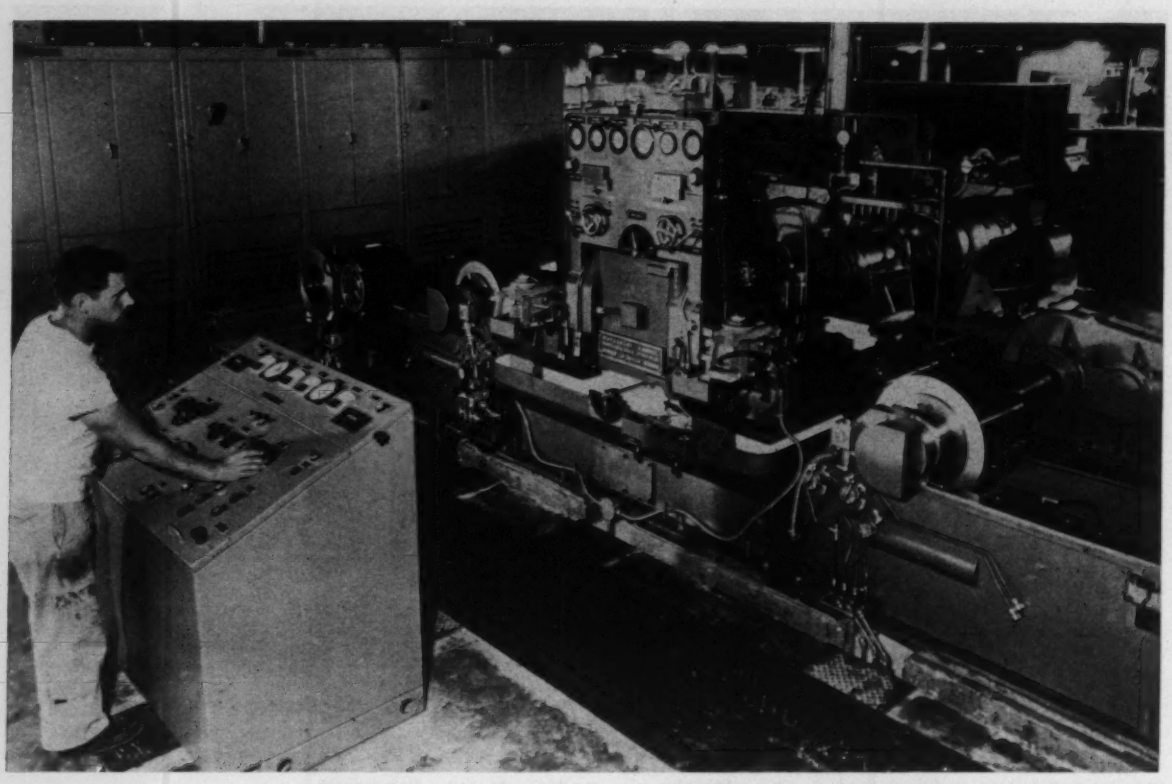
Present annealing uses cracked ammonia or a reducing type atmosphere. But David Schmid, president, and Ralph Cubbler, vice president in charge of production, feel that vacuum will result in an improved product.

The furnace to be installed, a variation of a basic German design of Glohpotfactory, Unna, West Germany, uses a pot over the furnace charge with walls only $\frac{1}{8}$ in. thick. The thin wall permits rapid heating. Also, being lighter, the pot is cheaper. Provision was made in designing the furnace for a vacuum both inside and outside the pot, making the thin wall practical. Otherwise, at temperatures used for annealing, distortion of the pot walls was likely.

In the original design, the heating portion of the furnace was movable while the pot positions were fixed. Techalloy's version will have the pots set on a cross-shaped track, moving to the furnace. A substantial saving in floor space is reported as a result.

• The plant accounting and inventory system is being changed to electronic processing.

The company claims it maintains

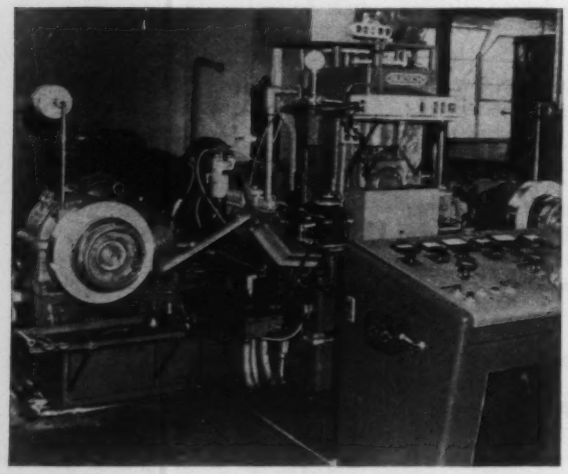


Sendzimir mill, built by Waterbury Farrel Foundry & Machine Co., a division of Textron Inc., was brought down and installed by Techalloy in 60 days

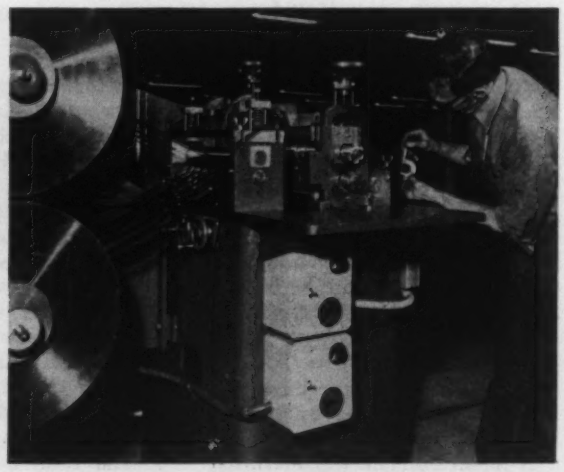
an unusually heavy inventory, feels that prompt and accurate reporting of stocked materials is most important for good customer service.

The high level of inventory serves a double purpose. It helps bring in orders by speeding delivery dates, and it acts as a buffer for the 100 man labor force—it produces for inventory during sales lulls, so the workweek has never dropped below 40 hours.

The high inventory level is also considered a weapon in meeting foreign competition. Says Mr. Schmid: "Foreign producers will offer more competition in our area of stainless wire and nickel alloy wire and strip. We're meeting it by offering better service, faster deliveries. And we make trips overseas to study new methods which could help us do a better job."



Four high Reusch mill gages thickness electronically, can make chart record



Operators for precision slitters used on strip must know maintenance steps

"KEYSTONE WIRE made this part possible" at International Screw Company

flowability IS THE SECRET

International Screw Company, Detroit, Michigan, manufactures a special weld stud fastener for one of the 1961 automobile models. The combination large head, deep collar and weld points required unusual flowability.

This weld stud now is formed in an extreme double blow with no head or collar cracking. Keystone Cold Heading Wire fills the dies completely giving sharp, clean edges . . . long die life and trouble-free production runs. Of this, W. C. Nelson, President of International Screw says, "Keystone Wire made heading this part possible."

Here is another case where Keystone Cold Heading Wire and its flowability characteristics solved a difficult forming problem. May we suggest you, too, try Keystone Wire for difficult cold heading jobs, and for ordinary ones, too!

A Keystone Wire Specialist will gladly discuss your wire forming problems with you and make recommendations. Call him at an early date and let him show you how Keystone Flowability can help you, too.

Keystone Steel and Wire Company, Peoria, Illinois

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WIRE FOR INDUSTRY

MANUFACTURED AT PEORIA, ILLINOIS, U. S. A.

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Ferrous, Nonferrous Metals Yield to Plasma Torch

Applications for the cutter include die shaping, scarfing, skinning, beveling for welding, and piercing. Simple, accurate controls permit quick adjustments

THIS PLASMA cutting torch easily cuts conductive materials. It's effective with steel, stainless, aluminum, copper, cast iron, or other metals 4 in. or more thick. Even such metals as tungsten, molybdenum, and tantalum can be cut.

The unit can also do die shaping, scarfing, skinning, beveling for welding, piercing, and other similar work. It operates on dc power.

The torch employs argon, nitrogen, and hydrogen mixtures. (Other operating gases can also be used.) It fits any standard cutting carriage or pantograph.

The torch is centered in line with the torch holder.

Simple, accurate controls for gas mixtures, gas velocities, and electric power permit quick adjustment for metal thickness and for cutting speeds from 1 in. to hundreds of inches per minute.

With plasma velocities over 10,000 mph and temperatures over 50,000° F, fast work is possible. Cutting speeds: ¼ in. plates, 525 inches per minute; ½ in. plates, 200 ipm; ¾ in. plates, 100 ipm; 1 in. plates, 80 ipm; 1½ in. plates, 50 ipm; 2 in. plates, 40 ipm; and 3 in plates, 20 ipm. Those speeds are not maximum, but are limited by the speeds of traveling mechanisms and available power, says the company.

High quality, drossfree cuts are produced. The equipment can cut stacked sheets without welding them together.

The watercooled, gas sheath stabilized torch produces a high power electric arc within the ionized plasma stream. The operator starts the torch by pushing a remote control button (it is stopped the same way). With the high heat transfer rate of the cutter, no preheat time is required. The ultrahigh velocity of the plasma provides the necessary momentum to wash the molten metal from the kerf region.

The stop button allows instantaneous shutoff of power, gases, and traverse mechanism for maximum economy of operation.

The plasma flame cutter produces a high power electric arc which is transferred from the torch cathode to the work (anode) within a high velocity plasma gas stream. Heating of the metal results from electrons hitting the work and from plasma heating. The plasma stream provides the momentum to wash the molten metal from the kerf region

Operating advantages: Torch to work distance is not critical; replacement of parts is simple and inexpensive; and little operator training time is required.

The control console provides gas and electric metering so procedures can be established and checked. The torch can be used for straight line or shape cutting.

Completely integrated packages which include cutting torch, control console, remote control, gas controls, and power supply are available.

For further information, *write* Thermal Dynamics Corp., Lebanon, N. H.

Ultrasonic Generator Fits Into Many Applications

A COMPACT, flexible, 100 watt, ultrasonic generator has been developed by International Ultrasonics Inc. It has connections for ten output impedances.

The generator is suitable for ultrasonic welding, soldering, splicing, and sealing of metals and plastics, ultrasonic cleaning, ultrasonic drilling, and use with processing cylinders or other specialized transducers. Power output is continuously variable.

Frequency range of the standard unit is 35 to 45 kc and im-

pedances are 17.5 to 20,000 ohms. Others are available. The unit may be used with piezoelectric or magnetostrictive transducers.

For further information, *write* International Ultrasonics Inc., Rahway, N. J.

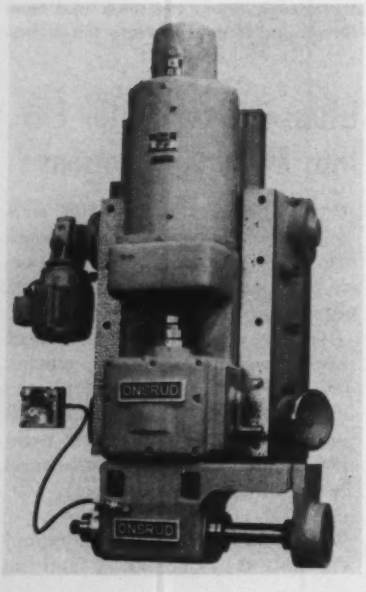
Replacement Milling Heads Pack High Horsepower

COMPACTNESS and high horsepower are features of the Onsrud multiple speed replacement milling heads. The units provide a large selection of milling speeds through a gear train drive for milling all ferrous and nonferrous materials.

The spindle heads (MH-50 series) are built in two basic types with a choice of 20 or 24 spindle speeds. One has a speed range from 12½ to 1250 rpm, the other 18 to 1783 rpm. Over-all dimensions with a vertical spindle are 20 in. square and 54 in. high. The spindle head provides a 50 hp drive.

The units are built with Onsrud, liquid cooled, constant speed, electric drive motors. Two speed drive motors are also available with a 25 to 50 hp rating.

You can get a right angle attachment for mounting a milling cutter at a 90 degree angle to the main spindle axis. Slides (for machine mounting) are supplied to customer specifications.



Vertical positioning of the head is obtained through power drive and final manual micrometer adjustment. The power has an inching feed for close approach. Electrical equipment includes starters, pushbuttons, disconnect switches, interlocks, and horsepower meters.

For further information, *write* Machine Tool Div., Onsrud Machine Works Inc., 7720 Lehigh Ave., Niles 48, Ill.

Machines, Many Devices Positioned Automatically

AN ELECTRICAL-mechanical servo device (Hanna-Powr Positioner) automatically positions such things as machine tools, valves, float levels, doors, and hopper gates at any of several predetermined positions corresponding to a control selector switch signal.

It's used with such power mechanisms as air or hydraulic cylinders and solenoid valves. The positioner has two cam rods and a connecting link on one end attached to the mechanism the positioner is controlling. The other two ends of the steel cam rods trip limit switches as the cam rods slide back and forth inside the two channel grooves in the extruded aluminum positioner housing.

There may be as many as 14 sets of limit switches per foot (14 different positioning stops per foot in the positioner). Standard sizes go up to 8 ft.

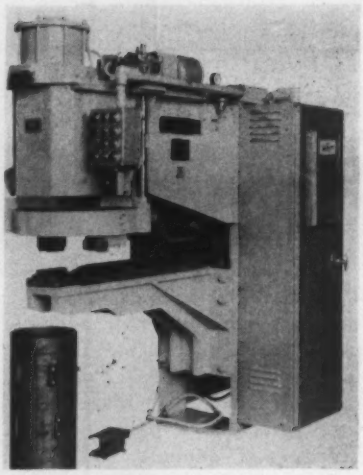
For further information, *write* Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.

Four Pushbuttons Cover Range of Weld Forces

THE PRESS type, projection welder made by Federal is equipped with a special, four station, dial type, upper dieholder.

A four pushbutton station is provided for selection of four different weld forces. The upper head automatically moves the die selected to the weld station.

Adjustment of air pressure and heat for each station is automatic.



The tank or part to be welded is manually positioned after station selection, then the operator starts the machine with a two position pedal. The first position brings down the head only so part position can be checked before welding. The second position starts the weld timer sequence.

The unit has a throat depth of 48 in. from the center line of the slide to the front face of the frame and the lower arm is made of fabricated steel with a cast copper conductor.

The machine is powered with a 500 kva, water cooled, welding transformer arranged with 16 steps of heat regulation. It's capable of providing 100,000 maximum, secondary, short circuit amperage.

For further information, *write* Federal Machine & Welder Co., Warren, Ohio.

Unit Presses, Stakes In One Automatic Cycle

PRESSING AND staking are combined in a one cycle automatic operation by a power hold-down unit. A foot switch is used to synchronize both operations.

The operator can use both hands to position the work. When the pedal is actuated, air at controlled pressure drives the ram downward to hold down the parts or secure a press fit. As the desired hold-down pressure is reached, an automatic valve releases compressed air to the staking punch inside the hold-down ram to complete the cycle.

Interchangeable hold-downs and

split-second response!
more work per hour!

with Valvair® HI-SPEED INLINE VALVES

- **solenoid coil guaranteed against burn-out for life of valve**
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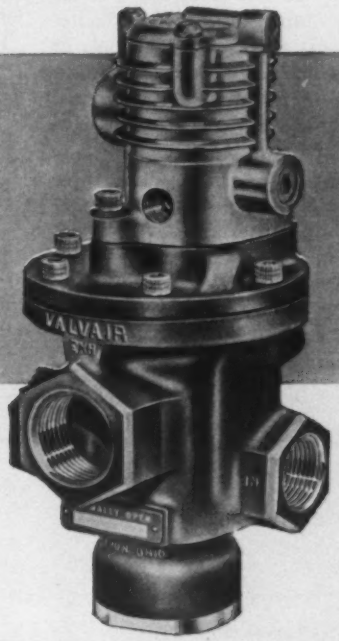
- **multi-million cycle dependability • JIC pilot**



HI-SPEED INLINE with integral pilot, 2- or 3-way, NO or NC, ⅜ to 1¼ in. NPT.

Short poppet travel in Valvair's HI-SPEED INLINE provides maximum flow almost instantaneously. This shortens machine cycle time . . . lessens brake and clutch slip . . . provides more accurate cuts on high speed cut-offs . . . decreases set-up time . . . minimizes drift, for safer operation.

For increased production . . . lower costs . . . greater safety . . . specify Valvair HI-SPEED INLINE valves.

Write for free Bulletin HIN. Address: Bellows-Valvair, Akron 9, Ohio, Dept. ST-1260.

Bellows-Valvair
AKRON 9, OHIO
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

8119

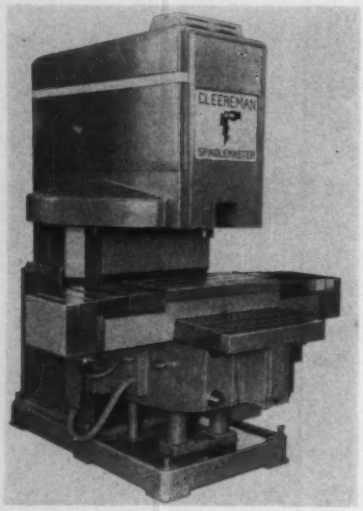
stakes are available. Tool change for a new job takes less than 15 seconds. Hold-down pressure and staking force are independently adjustable.

For further information, *write* Cramer Controls Corp., Centerbrook, Conn.

Tool Change Automatic in Tape Controlled Machine

TOOL CHANGES are made automatically in less than 8.5 seconds on the tape controlled Spindlemaster. It selects from 30 tools in a magazine while the table is positioning for the next operation. It can drill, tap, bore, ream, or mill rapidly and concisely.

Through tape, it positions three axes—single spindle and compound table and controls 18 spindle speeds from 150 to 3125 rpm, 98 spindle feeds from 0.4 to 19.8 in. per minute, spindle and table traverse, coolant cycle, and type of operation.



The boring tool can be withdrawn from the work at the power rapid traverse rate, or the feed direction can be reversed without reversing direction of spindle rotation (this retracts the tool at the same feed rate at which it is fed down). Advantages claimed for this feature: A better finish, a more accurate hole size, and elimination of spiral tool marks.

The table and carriage are mounted on an adjustable knee with twin raising screws. The table has 8 in. of vertical adjustment in 1 in. increments. A tape command illuminates one of eight lights on a height setting gage to show table height position.

Specifications include 9.999 in. spindle travel, 16 x 30 table size, 16 x 24 in. table travel, 18 in. turret to table part clearance (maximum), 30 x 18½ x 16 in. maximum part size, and a maximum tool diameter of 4 in.

For further information, *write* Jackson-Fotsch Co., general distributors for Cleereman Machine Tool Corp., 7350 W. Lawrence Ave., Chicago 31, Ill.

Pushbutton Control Attaches to Press Brakes

A PRODUCTION control called Autobend automatically eliminates whipping and assures uniform bending on press brakes. It automatically cycles the brake and provides the correct bending speed.

Installation requires no major change. It can be attached to any size and model brake. Skilled operators are not required. It features pushbutton programing for every type of production and customwork.

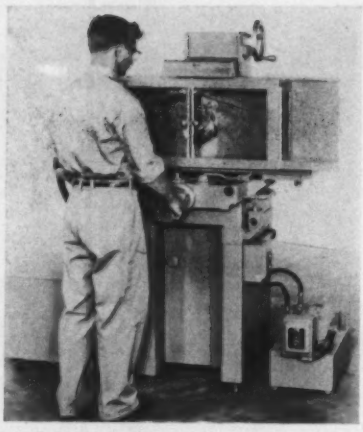
Stepless speed control to 100 per cent permits peaking to the maximum bending speed that the work will allow. You can use two operator control of any operation.

For further information, *write* Dept. A-9, General Automation Corp., 40-66 Lawrence St., Flushing 54, N. Y.

Low Priced Unit Slices Silicon, Quartz, Carbides

HARD, BRITTLE, friable, or shock sensitive materials can be cut on a low priced version of DoAll's Microtom-atic slicing machine. The unit (Model MTM-612) can do more productive slicing of silicon, germanium, quartz, ceramics, ferrites, and carbides.

The machine has a 6 x 12 in. table area, 12½ in. table traverse, 6 in. cross feed, and many features of the larger Microtom-atic machines (such as precision spindles and automatic lubrication, drive, and coolant systems).



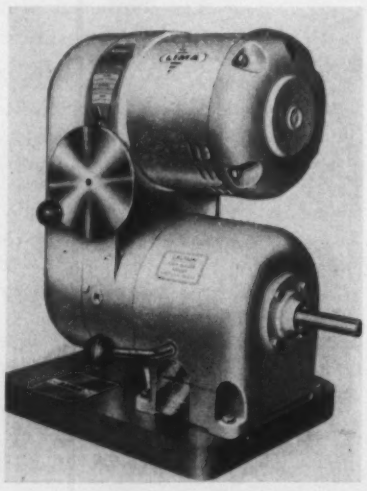
Individual needle valves supply coolant to both sides of the cutter.

For further information, *write* DoAll Co., Des Plaines, Ill.

Variable Speed Drive Has Four Speed Transmission

INFINITELY variable speeds are provided by the Lima Vari-Gear drive: 180 to 1800 rpm with an 1800 rpm motor or 120 to 1200 rpm with a 1200 rpm motor. The drive has a four speed transmission.

Dripproof or totally enclosed, fan cooled units can be furnished in ½, ¾, or 1 hp. A control wheel regulates the output shaft to the desired speed. A pointer indicates (on a



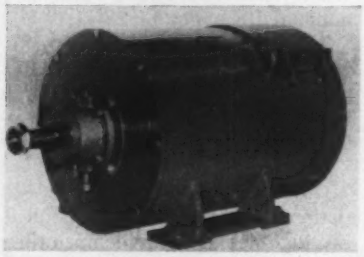
calibrated speed plate) the rpm at which the output shaft is turning.

For further information, *write* Dept. 149, Lima Electric Motor Co. Inc., Lima, Ohio.

Permanent Magnets Used In Run-Out Table Motors

RUN-OUT table motors for steel mill applications offered by Westinghouse are rated from ½ to 5 hp with a base speed of 575 and 750 rpm. The 240 volt units are suited for adjustable voltage operation.

Featured are permanent magnets which replace main field coils of



standard design and require no field excitation power supply. No dc power supply generator or field leads are required.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Range of Coil Widths Handled by One Lifter

COILS WITH cores in the horizontal position can be handled by C-F tong action coil lifters. One lifter handles a complete range of coil widths. Only one man is required (the crane operator).

The units are designed with lifting legs that are in a vertical position at any opening, permitting the crane operator to pick up or set down a coil using a minimum of space (as little as 10 to 12 in. between stacks of coils, regardless of coil width).

Motor operation of the lifter and swivel enables the crane operator to grab, lift, carry, rotate, set down, and release a load safely and quickly. Different sizes, opening ranges, and load capacities are available.

For further information, *write* Cullen-Friestedt Co., 1300 S. Kilbourn, Chicago 23, Ill.

Silicon Rectifiers Used In Series of Arcwelders

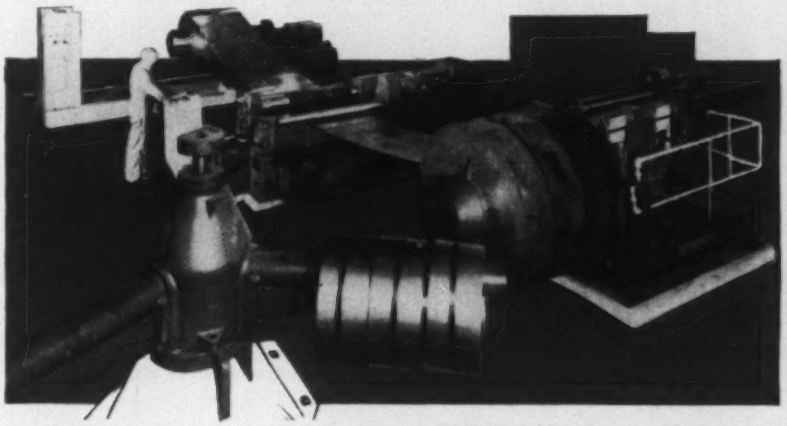
PRODUCTION, structural, and maintenance welding are applications for Lincoln Electric's three phase, rectifier, direct current arcwelders. The series (Idealarc R3M series) is designed to NEMA industrial standards of 40 volts, 60 per cent duty cycle. Efficient silicon rectifiers are used to produce dc output in four sizes: 300, 400, 500, and 650.

Output characteristics of the rectifier design are aimed at preventing electrode sticking on low current, small diameter, electrode applications. At high amperage settings, the unit maintains a smooth, quiet arc transfer.

The front panel contains the current control for continuous adjustment of full range output without

Stamco

slitting and coiling line saving time and material in west coast installation



UTILITY APPLIANCE CO., of Los Angeles now has line to handle 20,000 lb. coils up to 48" wide and gauges up to ⅛ inch. Low investment—long life—make this a wise move toward reducing operating costs.

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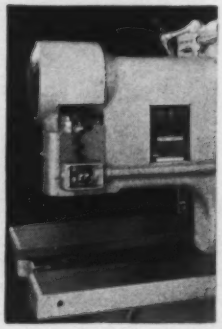

FEATURING the new *Strippit Electro-Hydramatic Head* — simplified design... minimum number of parts... needs no pressurized air. Makes the 15A easier to install, simpler to maintain, more economical to operate.

punches
any round or shaped hole up to 3½" diameter in sheet material — up to ¼" mild steel.

notches
90° corners — rectangular, radii, vee and special shape edge notches — up to ⅛" capacity in mild steel.

nibbles
straight line or contour shearing up to 38" diameter circle, at 165 strokes per minute, ⅛" mild steel.

accurate, quick-set gauging
a unique, multiple-stop system for exact work positioning to any layout specifications — *in seconds.*

quick-change punches and dies
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easy conversion
to a high speed production punching unit with the Strippit Duplicator and the Dupl-O-Scope or Microbars to punch Duplicator templates.

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NEW PRODUCTS and equipment

making intermediate range changes. Standard equipment includes a polarity switch for reversing current flow without changing cable connections.

For further information, *write* Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17, Ohio.

Compact Ultrasonic System Cleans Small Parts

SMALL PARTS and subassemblies can be cleaned at production rates in plants using the Model LG-75 ultrasonic cleaning system. It's powered by a 75 watt Sonogen generator driving a transducerized tank at a nominal frequency of 25 kc.

Transistors are used in the compact unit. The generator cabinet measures 12 x 10 x 5½ in. Output is easily switched between a cleaning and a rinse tank. You can get 1 or 2 gallon stainless tanks (Type 316L, Heliarc welded). Both have optional, thermostatically controlled, heating elements for temperatures up to 200° F. The 1 gallon tank is recommended for difficult or fast cleaning. Total weight of generator and one LTH-60-M tank is 36½ lb.

For further information, *write* Branson Ultrasonic Div., Branson Instruments Inc., 40 Brown House Rd., Stamford, Conn.

Company Offers Motor Mounts for Its Drives

COMPACT, steel, predrilled weldments are available for mounting rerated NEMA motors (½ to 30 hp) directly to Falk, shaft mounted, flange mounted, and screw conveyor drives.

Advantages: 1. They eliminate need for motor bases and foundations. 2. Users can mount motors in almost any position around the perimeters of reducers to save space. 3. Belt tension can be simply maintained by adjusting base plate screws.

For further information, *write* Falk Corp., P. O. Box 492, Milwaukee 1, Wis.

NEW literature

Write directly to the company for a copy

Stand-Off Fasteners

"What You Should Know About Stand-Off Fasteners" covers such subjects as: Advantages and disadvantages of various designs and materials, installation costs and how to reduce them, high cost of unnecessary rework, how to select fasteners, and other areas for improving fastening methods. Western Sky Industries, 21301 Cloud Way, Hayward, Calif.

Gas Handling Silencers

Acoustic and aerodynamic characteristics of the various types of Silentflow gas handling silencers are described in Bulletin B-13. Design charts give the proper selection of the type of silencer and its optimum size. Silence Inc., P. O. Box 21, Farmingdale, N. Y.

Die Stamped Circuits

"Designing With Die Stamped Circuits," 12 pages, helps evaluate this relatively new development in printed circuitry by comparing its features, one by one, with those of the older, conventional etched printed circuits. Dytronics Inc., Rochester, Mich.

Creep Resistant Titanium Alloy

"Properties of Ti-8Al-1Mo-1V," 12 pages, outlines forging and heat treat procedures for the alloy. It also discusses its creep, stability, and fatigue properties. Titanium Metals Corp. of America, 233 Broadway, New York 7, N. Y.

Control Transformer Data

Electrical performance characteristics, performance at temperature extremes, outline drawing, average mechanical characteristics, and phasing information on the company's line of 17 synchro control transformers are covered in four technical data sheets. Avionic Div., John Oster Mfg. Co., Racine, Wis.

Selector Chart

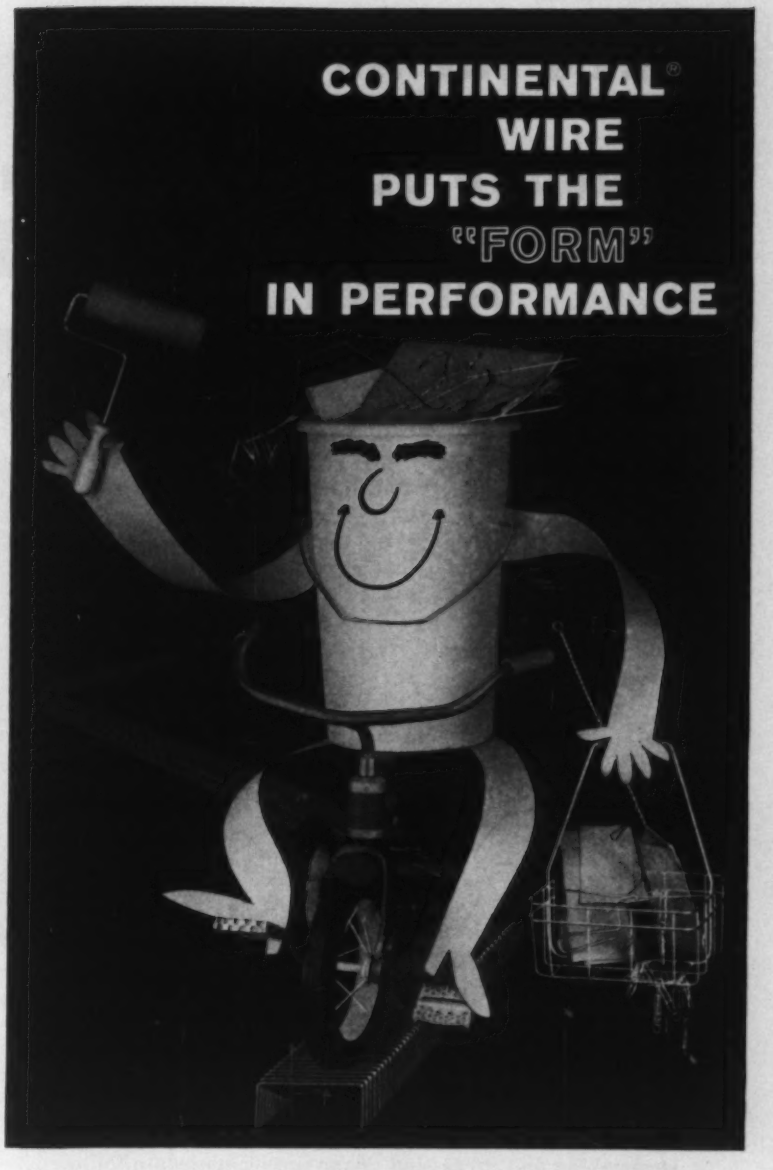
A selector chart matches the proper chromate coating to the type of finish desired. MacDermid Inc., Waterbury, Conn.

Welded Steel Tubing

Dimensions and weight per foot for round mechanical tubing, square and rectangular tubing, and pressure tubing, are given in a 16 page brochure. Electricweld Tube Div., Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh, Pa.

Protective Coatings

Bulletin No. T-95-61 covers the properties and specification data on nine Bitumastic products. It also lists typical installations requiring corrosion protection along with the recommended Bitumastic coating to assure lasting protection. Tar Products Div., Koppers Co. Inc., Pittsburgh 19, Pa.



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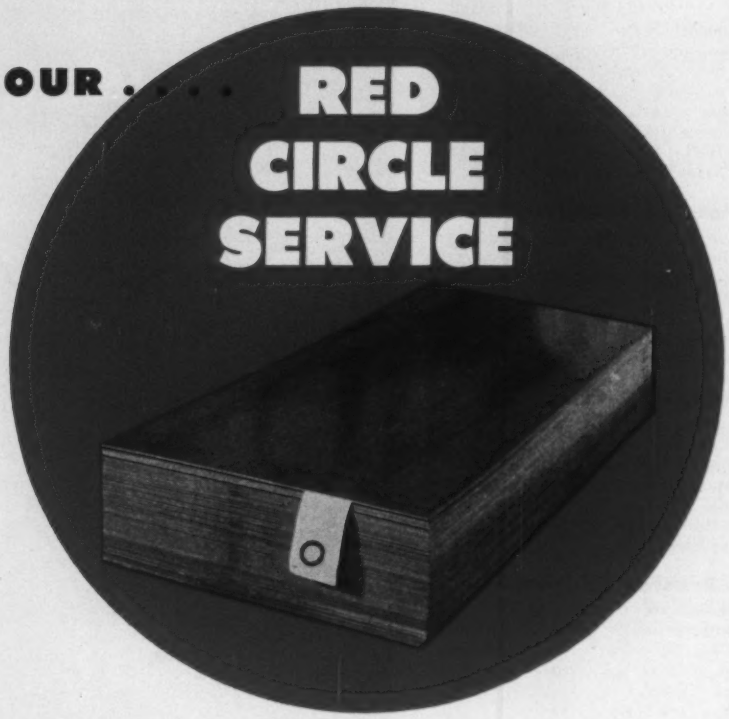

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Hot Rolled Pickled Sheets		Spiral Welded Pipe

Outlook Bleak for December

IT WILL BE a downhill ride the rest of the year, and steelmakers know it.

They've looked high and low for signs of an upturn, but here is what they've found: Customers aren't going to step up their buying until the first quarter of next year. Instead of ordering more steel this month than they bought in November, they'll probably take less. Reasons:

- They'll need less—especially if they're in construction or canmaking, industries that are declining seasonally.
- They're trying to keep their inventories down because: 1. They want to show a good cash position when they close their books. 2. Some states will tax them on yearend value of inventories.

HOPES FRUSTRATED—Market analysts had hoped that November would bring at least a modest pickup in order entry, but it didn't. Some mills booked about the same tonnage last month that they sold in October; others booked slightly less. Inventory liquidation continued, and there was no need to increase steel production. Last week's output of 1,404,000 ingot tons brought the November total to about 6,175,000 tons—the lowest of any month this year. Operations edged upward a little after the Thanksgiving cutback, but not because of any betterment in the outlook. (The ingot rate climbed 1.3 percentage points to 49.3 per cent of capacity.) Look for another little spurt this week—to 50 per cent or so—but don't expect the rate to go much higher at any time in December. It will drop back into the forties during the Christmas week.

FEW BRIGHT SPOTS—Although there's little to cheer about in the near term, steelmen are hoping for moderate gains in at least two product areas—sheets and oil country goods. Sheets are going to appliance makers in greater volume because of the rush to get new models in dealers' showrooms before Christmas. Oil country tubing and casing should profit from a recent drilling upturn, though it may be a few weeks before increased consumption is translated into new orders.

MILLS HOLDING BAG—To keep their inventories down, some fabricators have adopted buying practices that shift the warehousing burden to the mills. They're doing it especially in plates. They cut their inventories to a bare minimum and set them aside as emergency supplies. When they get a job and can count on fast delivery from a mill, they order just what they need to meet the job specifications. They don't touch their stockpiles unless the mill can't deliver on time.

99 MILLION TONS?—At the end of November, 1960 steel production was close to 93.4 million ingot tons. To reach 100 million by yearend, the industry would have to operate at 52.5 per cent of capacity this month (vs. 50.6 per cent in November). The odds are against it because: 1. Last month's orders (no better than October's) will be this month's production and shipments. 2. Steelmakers will sharply curtail output between Christmas and New Year's Day.

EXPORTS DECLINE—Steel product exports fell sharply to 226,000 net tons in September, 102,000 tons below the August figure. Imports climbed 12 per cent to 207,000 tons, their highest point since June. In the first nine months, exports were more than 2.3 million tons (vs. 1.4 million in the same period last year). Imports were nearly 2.8 million tons (vs. 3 million a year ago). If the September trend continues, the U. S. will have another foreign trade deficit in steel this year with imports exceeding exports by about 300,000 tons. Last year's deficit was nine times that amount.

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*Current prices were published in the Nov. 28 issue and will appear in subsequent issues.

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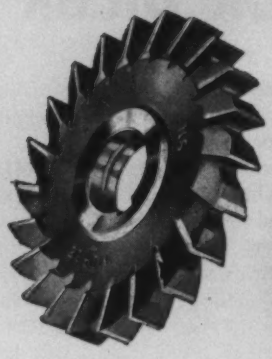

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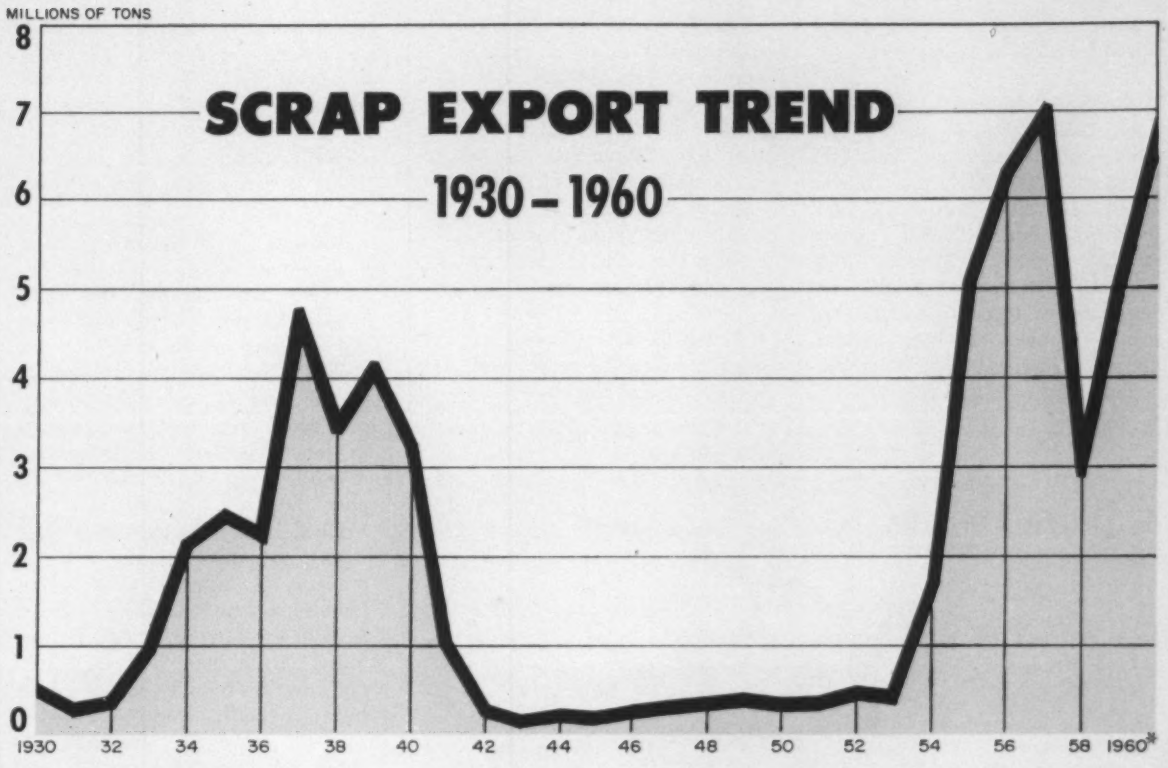

*Projected: Last four months of the year estimated on the basis of average monthly exports in the first eight months.

Near-Peak Scrap Exports Bolster Market

FOR MORE than 30 years, exports of iron and steel scrap have been a controversial subject among scrapmen and their domestic customers. They're running at a near record pace this year, providing a much needed lift for a market sorely beset by lagging domestic demand. Exports have had a bolstering effect on prices at some points, particularly in the East.

The projected 1960 export movement (based on eight months' data) is 6.7 million net tons, only about 100,000 less than the record 6.8 million shipped out of the country in 1957 (see chart).

• **Heavy Tonnage Licensed**—Even should September-December shipments fail to attain the monthly average rate for the year through August, traders confidently expect that more than 6 million tons will be moved abroad. Their projection is based on export licensing (January through September) covering 5,882,977 net tons.

Something like 23.4 million net tons of purchased scrap were available for domestic consumption and export in the first eight months of this year. Exports accounted for around 19 per cent of the total. That compares with 14 per cent in all of 1959 and 18 per cent in record 1957. The bulk of dealer scrap, of course, moves into domestic consumption at all times.

• **Reflects Sluggish Steel** — The bulge in foreign shipments in 1960 reflects the sluggish steel situation here, domestic mills operating only at a little better than 50 per cent of capacity in recent months. Meanwhile, foreign steelmaking capacity has been engaged at a relatively higher percentage rate. For example, the European Coal & Steel Community (informally known as the Common Market, and consisting of France, West Germany, Italy, Belgium, Holland, and Luxembourg) will produce almost 81 million net tons of raw steel this year, up more than 11 million from 1959 for the greatest jump in a single year.

The strong export movement this year has been particularly helpful to scrap firms with easy access to seaboards. However, since the opening of the St. Lawrence Seaway, scrap has been moving for export in growing volume through Great Lakes ports, which are opened to foreign trade about seven months of the year. About 100,000 net tons will have moved from the Chicago area (including Milwaukee) before navigation ends this year. That's

a sharp increase over the 30,000 moved from the area last year.

• **Movement Increasing** — Other Great Lakes ports are getting into the act on an increasing scale. It's estimated 100,000 tons moved through Detroit to Europe this year, while another 100,000 moved through that port to Canada. Substantial export tonnage also has been shipped through Buffalo, and a little tonnage has been handled through Cleveland area ports, particularly Ashtabula, Ohio.

Lake port tonnage (particularly at scrap-plus areas) is expected to increase when better dock and handling facilities become available. However, volume will depend on domestic requirements, as the domestic mills and foundries will continue to have first call on supplies at all times, even though exports usually command a premium over the domestic price level.

• **Check Gold Outflow**—Heavy exports of scrap this year, while taking up some of the slack in demand occasioned by sluggish domestic steelmaking operations, are also benefiting the U. S. economy in still another way—they are helping the U. S. reduce its international balance of payments deficits, thus assisting in stemming the nation's outflow of gold.

Japan is the largest purchaser of U. S. export scrap, taking 2.2 million net tons in the first eight months this year. That's just about 50 per cent of the total for the period, 4,522,174 tons. Prior to World War II, considerable criticism arose over heavy scrap exports to Japan, leading to continuance of government export controls long after the war.

Until 1954, the government held exports to a trickle in deference to requests of domestic steelmakers, foundrymen, and others, urging controls in the interest of national defense. Since then, however, limits on sales to friendly nations have been gradually removed (licenses are still required), resulting in a sharp rise in trade during the last several years (see chart).

• **Needs Less Pressing**—In recent months, domestic steelmakers have not been especially vocal in protesting scrap exports. Their scrap needs today are less pressing, not only because of reduced steelmaking operations, but also because of increased availability of hot metal, and lessened dependence on scrap since the advent of oxygen melting and more efficient steelmaking practice. Still, domestic consumers of all classifications continue concerned, and can be expected to press for a tightening of export controls if scrap shortages threaten at any time in the future.

Scrap Use Tops Pig Iron In Two Successive Months

Domestic consumption of ferrous scrap for all purposes was greater than pig iron for the second consecutive month in September, reports the U. S. Bureau of Mines. The total metallic charge (7,890,000 gross tons), excluding iron ore and agglomerates, consisted of 52 per cent scrap (4,163,000 tons) and 48 per cent pig iron (3,817,000 tons). Those figures compare with 51 per

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cent scrap (4,217,000 tons) and 49 per cent pig iron (4,121,556 tons) in August.

Stocks of ferrous scrap held by domestic consumers on Sept. 30 amounted to 8,490,000 gross tons, 1 per cent less than the 8,597,703 tons held at the end of August. Pig iron stocks at the end of September were 3,230,000 tons, 2 per cent less than the 3,300,063 tons held at the end of the preceding month.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 142

Backlogs at reinforcing bar mills are declining seasonally, but shipments are continuing to be pushed on old orders as work on many construction projects is rushed to beat the usual winter slowdown. A Southern mill reports it is producing in about the same volume as it has the last four months. Consumers are ordering largely for quick delivery, with the result that backlogs are not being added to substantially.

Steel Bars . . .

Bar Prices, Page 140

November hot rolled bar bookings were only slightly better than October's, and the outlook for December is not encouraging. A little pickup in railroad equipment specifications is noted, but, otherwise, the market is unchanged from that prevailing in recent weeks.

Continued slack demand reflects cautious buying, slow consumption, and prolonged inventory liquidation. Automotive orders are tapering as Chrysler Corp. curtails output. Cold finished bar mill operations remain in the doldrums, and the service centers are buying only what they need to plug holes in their inventories.

Users don't expect much improvement in sales in the immediate future. Consequently, there's little incentive for them to replenish their raw material stocks. If anything, they're under pressure to hold inventories down to minimize yearend tax liability.

Some barmakers are hoping for a moderate pickup in January, but most steelmen see no significant improvement in demand until February or March.

Buying in New England is mostly for armament contracts, including several hundred tons of hot rolled for remelting at Watertown (Mass.) Arsenal. On Dec. 8, Raritan (N. J.) Arsenal closes on 597 tons of hot rolled stock.

Hot rolled carbon bar deliveries still range two to four weeks. The situation continues easy in cold finished; most sizes are available from stock.

Wire . . .

Wire Prices, Pages 143 & 144

Merchant wire items continue to move slowly; they are available for shipment from stock. Manufacturers' wire deliveries range from two to four weeks.

Domestic mills continue to complain of sharp competition from foreign wire supplies. "Imports are still hurting us and will continue a pain in the neck in the months ahead," is the way a Birmingham

miller
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X-ray perfect MIG welds on aluminum, magnesium, stainless and carbon steel sheets down to .030" are the routine result with the New Miller Constant Potential, CP-3-VS. Continuous slope and voltage adjustment even during the course of the weld means that the operator is able to "tune in" the desired settings. There's no burn-through; there's no spatter. Actually, a new performance high in low voltage welding is established with the introduction of this welder with its broad range of from 300 amps at 30v to 25 amps at 10v. • Complete specifications, as well as recommendations for your particular application problems, will be sent promptly upon request.
miller ELECTRIC MANUFACTURING CO., INC., APPLETON, WISCONSIN
Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

area producer put it last week.

Of the 12,319 tons of steel imported into Chicago in October, via the St. Lawrence Seaway, 13 per cent consisted of wire and wire products.

Plates . . .

Plate Prices, Page 140

Demand for plates held steady at some mills in November but weakened at others. Buyers have been slow to place tonnage for December, so it's hard to say how the month will shape up. The consensus is it won't be any better than November, maybe not as good.

Shipments will probably be lower than November's because users will want to minimize yearend inventory taxes. Customers are operating on 30 to 45 day inventories, keeping that much steel for emergency use. When they get a job, and are assured of fast mill deliveries, they don't touch the steel in their warehouses; they order enough new mill tonnage to meet job requirements.

Tank manufacturers, truck body builders, shipbuilders, and general fabricators are complaining about poor business. It's unlikely that there will be much improvement until the second quarter. However, the outlook has been brightened by the placing of a $156,500,000 Navy carrier with the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. The placing of a $35 million contract for four cargo vessels for the American Export Lines has been delayed. Sun Shipbuilding & Dry Dock Co., Chester, Pa., is low bidder, but the San Diego, Calif., yard of National Steel & Shipbuilding Co., second low bidder, hopes to get the contract because San Diego is a so-called distressed area.

Freight car requirements have been stimulated by the placing of several fairly large orders. Bridge plans in New England include slightly heavier plate tonnage for girder spans. Bids are in at Portland, Oreg., for 900 tons of plates required for a municipal water storage tank. Also, Consolidated Western Steel Div., U. S. Steel Corp., will fabricate 3000 tons of plates involved in penstocks for the Spring Creek power project in northern California.

The Harrisburg, Pa., plate mill of Phoenix Steel Corp. will be permanently closed Dec. 31. It is outdated. Phoenix will continue to produce carbon plates and plate fabrications at its recently acquired plant at Claymont, Del. About 1500 employees will be affected by the Harrisburg closing.

Facilities at Harrisburg include a universal plate mill. Floor plate, which has been rolled at Harrisburg, will be produced at Claymont for the first time.

Facilities for handling hot metal between the company's nearby Chester, Pa., blast furnace and Claymont are under study. The company's Phoenixville, Pa., plant is not affected by the Harrisburg closing.

Distributors . . .

Prices, Page 146

Business being booked by steel service centers lags. November tonnage was off a trifle from October's, and December bookings will likely decline further. Prospects for the

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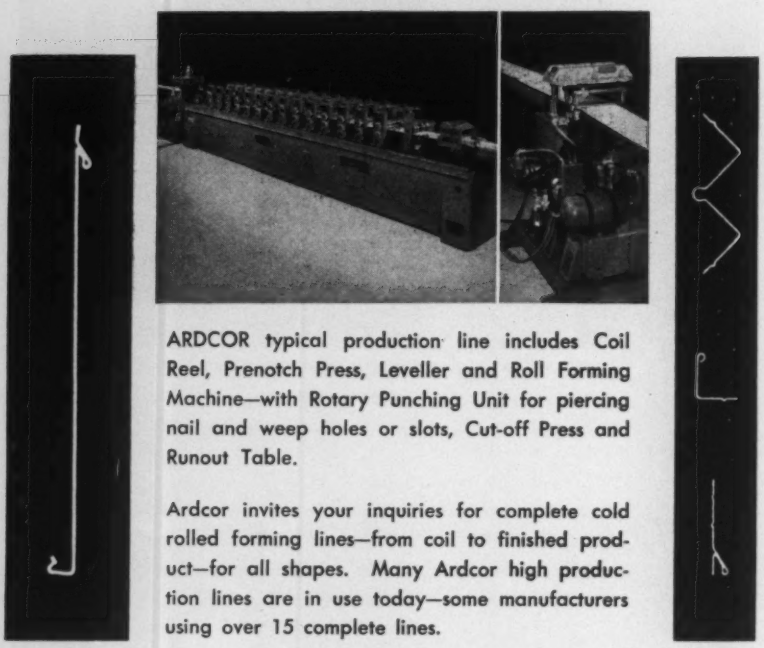

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first quarter of next year are not much brighter.

Sheets and light structurals appear to be moving better than most of the other major product classifications.

Competition for business has resulted in price shading in some districts. The smaller service centers have felt the price squeeze more than the major firms.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 142 & 143

About the best that can be said for the light flat rolled products is that they're holding their own. November bookings (comparable to October's) were sufficient to keep the mills running at 50 to 60 per cent of capacity. Sellers anticipate a mild gain in orders after the holidays, but they anticipate little change this month because users will try to keep stocks down as yearend approaches. Reasons:

1. They'll want to show a good cash position when they close their 1960 books. 2. Some states will tax them on the value of their yearend inventories.

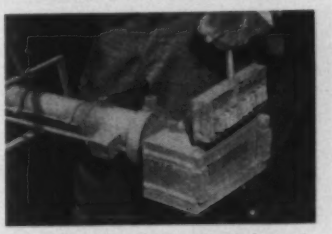
Automakers are buying fairly substantial tonnage on a regular basis, but they aren't expected to place any new orders of consequence until after the first of the year. Appliance manufacturers have stepped up their buying a little as they accelerate new model production. Service centers have apparently stopped liquidating their inventories, but they're buying only what they need to keep stocks in balance.

Galvanized sheets, in strongest demand of the flat rolled items some months back, are doing no better than the rest of the line now. Automotive demand hasn't increased as much as had been expected. Farm requirements are tapering.

Hot rolled sheets are available for delivery in two to three weeks, cold rolled in two to five, galvanized in about three weeks, and high silicon before the end of the year. Most producers of low silicon sheets have little tonnage to offer before mid-January. Long ternes are being offered for shipment in late January, and some enameling stock can be had before the end of this month.

This worker at the Coatesville, Pa. plant of Lukens Steel Company is using a Pannier Marker equipped with the newly-designed magazine-style marking head to stamp hot slabs with an identifying number.

Hot Steel Marking by controlled impact



This fast-change stamping head shown in operation above uses a type magazine. By the use of spare magazines for type changes, a new set of numbers can be dropped in place in seconds.

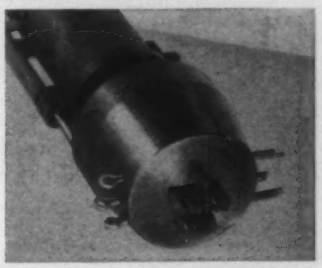
Uniformly clear stamping of heat or ingot numbers on billets or slabs, or serial or part numbers on hot forgings is provided by Pannier Single Stroke Pneumatic Markers.

The operation is positive, fast and automatic. The worker, standing comfortably back from the heat, is able to position the marking head accurately against the steel. The hammer first aligns itself, trips itself and makes the impact automatically.

The new head shown here incorporates a fast-change typeholder that permits users to change entire type set-ups quickly, easily and safely. Pre-set type is now economically possible. In just a few seconds, a spare type magazine with an all-new type set-up can be inserted into the marking head. Pre-setting type prevents costly down-time for changes.

The type magazine is made to accommodate lines of interchangeable characters positioned to your specifications. The type is held secure in the magazine by Pannier's sure-safe locks...spilling danger is eliminated.

Pannier engineers will be glad to consult with you on hot steel marking. For complete information, write



Hardened type is easily released for change in this style Pannier marker head by sliding out the pins. This head is effective where numbers are repeated on several pieces.

Pannier markers are now available for automated operation for larger billets and slabs. This numbering head contains a series of number wheels, rotated and set by push button, tape or card control. The entire marking operation can be completed by programmed remote control.

MASTER PANNIER MARKERS

PANNIER MASTER MARKERS
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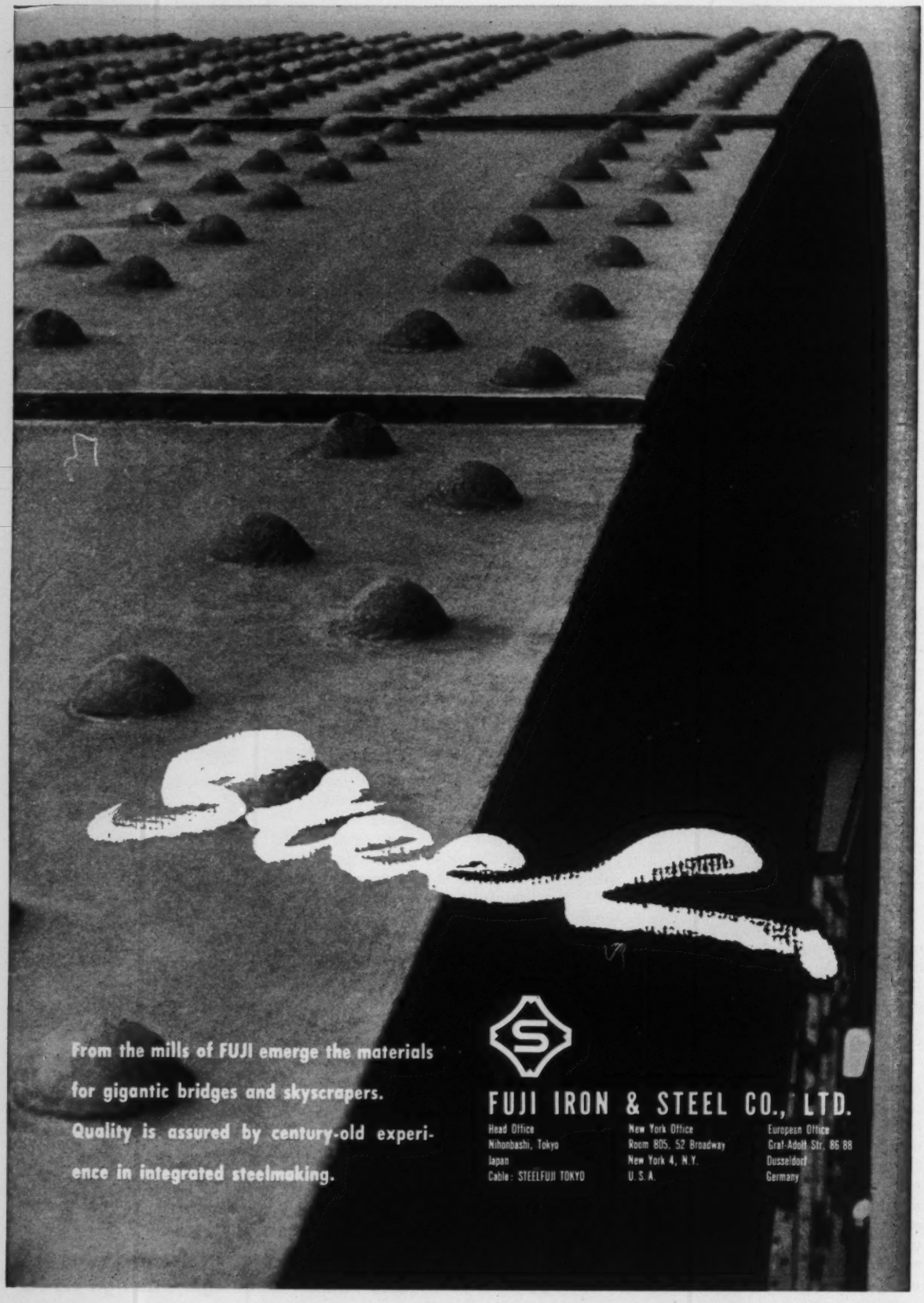

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Structural Shipments Up 17 Per Cent This Year

Shipments of fabricated structural steel during October exceeded the 300,000 ton mark for the fifth straight month, reports the American Institute of Steel Construction. The total was 313,623 tons, off about 10,000 from the preceding month.

It brought the movement for the first ten months of the year to 2,901,335 tons, up 17 per cent from the movement in the corresponding period last year, when the steel strike hurt sales.

October bookings were 219,803 tons, down 40,000 from the preceding month. Orders for the first ten months of the year were 2,747,644 tons, up 6 per cent from the same period last year.

Backlogs as of Oct. 31 were 2,027,776 tons. Of this total, 58 per cent (1,179,974 tons) were scheduled for fabrication during the four months ending Feb. 28, 1961.

Structural Shapes . . .

Structural Shape Prices, Page 140

Structural steel orders are off seasonally, but inquiry is reported picking up a little, and there are indications of a livelier market developing next month.

Several Eastern states are expected to take bids over the winter months on substantial bridge tonnages, specifying delivery of the fabricated steel by late spring. Several other states will probably put off taking bids on their highway programs until March and April.

Small structural fabricating shops hold limited backlogs as a rule, and they are ordering little plain material, although most of them have low stocks of wide flange beams.

Fabricators in the Far West report few sizable structural projects before the market for bids. Increased bridge construction is projected in Alaska, but those jobs won't come out until next year. Road construction in the West generally is off seasonally.

Wisconsin has announced a $112,733,000 heavy construction and improvement program for 1961 —about 35 per cent larger than that for 1960. Much of the increase is attributed to the release of federal funds due the state but which had been retained in the federal highway trust fund as result of the imposition of reimbursement planning. The 1960 program totaled $83,117,000. The record was $134 million in 1958.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4500 tons, Bell Telephone headquarters, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.; also required are 500 tons of bars.

1700 tons, addition, Ballantine Brewery, Newark, N. J., through United Engineers & Constructors, Philadelphia, to Belmont Iron Works, Eddystone, Pa.

900 tons, post office, Harrisburg, Pa., to Barber & Ross, Washington; also, 1300 tons of reinforcing bars to Bethlehem Steel Co., Bethlehem, Pa.; awards were through McCloskey & Co., general contractor, Philadelphia.

650 tons, municipal powerplant, Dover, N. J., to Frank M. Weaver & Co., Lansdale, Pa.

240 tons, post office building addition, Philadelphia, through McCloskey & Co., Philadelphia, to American Bridge Div., U. S. Steel Corp., Pittsburgh; 1700 tons of reinforcing bars to Bethlehem Steel Co., Bethlehem, Pa.

STRUCTURAL STEEL PENDING

300 tons, building 109, Hanford Works; bids to Kaiser Engineers, Richland, Wash.; postponed to Dec. 20.

144 tons, state bridgework, Chester-Delaware counties, Pennsylvania, bids Dec. 16.

100 tons or more, pumphouse and radiation structure, Hanford Works; Sound Construction & Engineering Co., Seattle, low at $131,447 to the Atomic Energy Commission.

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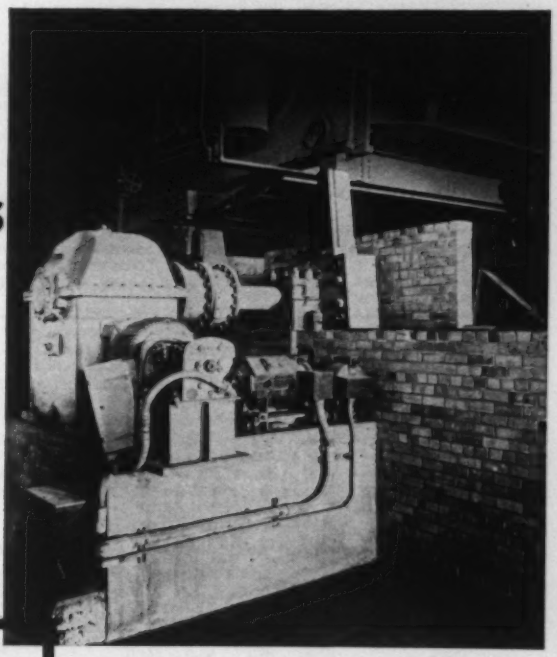

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Here's a closeup of tilting mechanism for an electric furnace. Standard, stock model, double-reduction Cone-Drive **double-enveloping worm** gear speed reducer tilts furnace and heat with combined weight of 700 tons.

Powerful Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

100 tons or more, radar towers, Malmstrom Air Field; bids to the U. S. Engineer, Seattle, postponed to Dec. 14.

55 tons, including reinforcing, Sitkim Gorge bridge, Clallam County, Wash.; bids to the U. S. Forest Service, Portland, Oreg., Dec. 15.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1700 tons, addition, post office, Philadelphia, through McCloskey & Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.; also, 240 tons of shapes to American Bridge Div., U. S. Steel Corp., Pittsburgh.

1300 tons, post office, Harrisburg, Pa., through McCloskey & Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.; 900 tons of shapes to Barber & Ross, Washington.

900 tons, Bureau of Reclamation, Spring Creek power project, Trinity River, Calif., to Pacific States Steel Co., Stockton, Calif.; Scheumann & Johnson, Seattle, general contractors.

500 tons, Bell Telephone headquarters, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.; also, 4500 tons of shapes to Bethlehem Steel Co.

REINFORCING BARS PENDING

285 tons, Navy General Stores Supply Office, Philadelphia; bids Dec. 12.

45 tons, also miscellaneous steel items, 235 ft span, Coos County, Oreg.; bids to the Bureau of Public Roads, Portland, Oreg., Dec. 12.

Unstated tonnage, Oregon State highway bridges, bids to Salem, Oreg., Dec. 9; Baker County, two railroad overpasses; Baker County, another railroad overpass; Douglas County, undercrossing; Malheur County, Malheur River bridge at Vale.

PLATES . . .

PLATES PLACED

3000 tons, penstocks, Spring Creek power project, Northern California, to Consolidated Western Steel Div., U. S. Steel Corp., Los Angeles; Schuemann & Johnson, Seattle, general contractors.

400 tons, three, water storage tanks, Foss Aqueduct, Washita Basin project, Bureau of Reclamation, Denver, to the Bering Co., Tank Div., Dallas.

210 tons, carbon hull plates, Navy General Stores Supply Office, Philadelphia, to Caine Steel Co., Chicago.

PLATES PENDING

125 tons, 300,000 gallon steel tank, Keams Canyon water supply, Arizona; bids Dec. 12 to the Bureau of Indian Affairs, Albuquerque, N. Mex.

Unstated, 2.4 million gallon steel watertank; bids to Alderwood Manor, Wash., Dec. 5; Lester O. Erickson, engineer.

RAILS, CARS . . .

RAILROAD CARS PLACED

Pennsylvania, 3500 freight cars, including 2500, seventy ton hoppercars, to own shops at Hollidaysburg, Pa.

Missouri Pacific, 1150 freight cars to De Soto, Mo., shops; equipment includes 750, fifty ton boxcars; 100, seventy ton boxcars; 250 covered hoppercars; and 50, seventy ton flatcars.

RAILROAD CARS PENDING

Chicago, Milwaukee, St. Paul & Pacific, 750, fifty ton boxcars and 40, double deck, stainless steel coaches.

Steel Shipments by Markets—September, 1960

(Net tons; all grades)

Markets:	September	% of Total	Nine Months	% of Total
Converting	198,001	4.0	2,366,777	4.1
Forgings (except auto)	53,838	1.1	687,450	1.2
Fasteners	70,651	1.4	859,685	1.5
Warehouses:				
Oil & gas	75,596	1.5	888,181	1.5
All other	754,842	15.2	9,333,599	16.2
Total warehouse	830,438	16.7	10,221,780	17.7
Construction:				
Rail transportation	3,803	0.1	39,717	0.1
Oil & gas	188,649	3.8	1,825,438	3.2
All other	521,876	10.5	5,908,264	10.2
Total construction	714,328	14.4	7,773,419	13.5
Contractors' products	250,359	5.0	2,936,471	5.1
Automotive:				
Cars, trucks, parts	1,100,129	22.1	11,221,071	19.5
Forgings	27,969	0.5	346,959	0.6
Total automotive	1,128,098	22.6	11,568,030	20.1
Rail transportation:				
Rails, track, equipment	21,209	0.4	665,551	1.2
Cars & locomotives	99,257	2.0	1,488,122	2.6
Transit systems	2,860	0.1	27,729	...
Total rail transportation	123,326	2.5	2,181,402	3.8
Shipbuilding	46,806	0.9	471,575	0.8
Aircraft	4,143	0.1	60,904	0.1
Oil & gas drilling	22,101	0.4	341,511	0.6
Mining, quarrying, etc.	16,611	0.3	222,298	0.4
Agricultural:				
Machinery	46,908	0.9	592,696	1.0
All other	18,054	0.4	191,885	0.4
Total agricultural	64,962	1.3	784,581	1.4
Machinery, etc.	241,111	4.8	3,241,172	5.6
Elec. machinery	150,238	3.0	1,628,529	2.8
Appliances	106,942	2.2	1,435,457	2.5
Other equipment	137,291	2.8	1,574,233	2.7
Containers:				
Cans & closures	329,268	6.6	4,237,819	7.3
Barrels, drums, etc.	61,674	1.2	677,000	1.2
All other	38,700	0.8	503,883	0.9
Total containers	429,642	8.6	5,418,702	9.4
Ordnance, military	11,788	0.2	121,820	0.2
Nonclassified	172,593	3.5	1,639,450	2.9
Total domestic	4,773,267	95.8	55,535,246	96.4
Exports	209,961	4.2	2,077,579	3.6
Total shipments	4,983,228	100.0	57,612,825	100.0

Data from American Iron & Steel Institute.

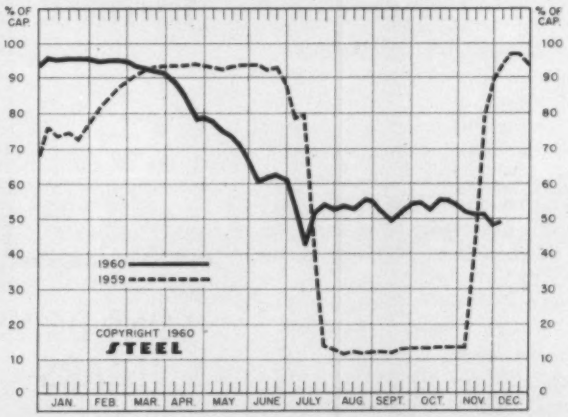
DISTRICT INGOT RATES

(Percentage of capacity utilized)

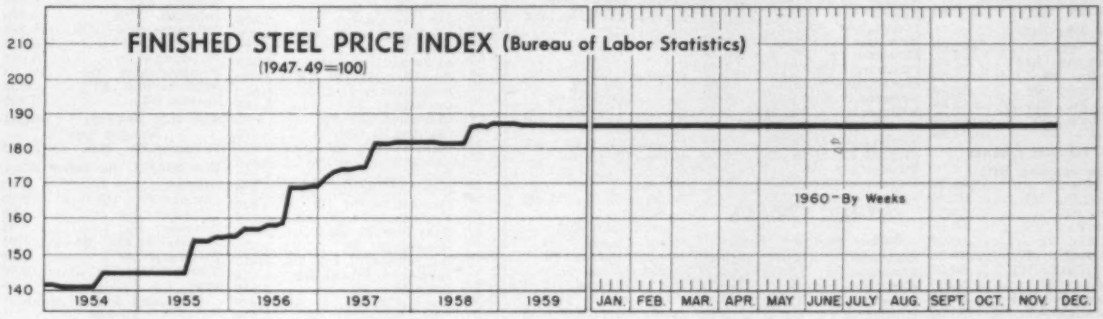
	Week Ended Dec. 4	Week Ago	Month Ago	Year Ago
Northeast	50	47	54	100
Buffalo	48	49	59	103
Pittsburgh	47	46	48	96
Youngstown	34	27	42	92
Cleveland	51	54	59	93
Detroit	65	67	64	97
Chicago	51	53	52	92
Cincinnati	52	54	58	88
St. Louis	59	50	73	110
Southern	54	52	52	87
Western	49	46	46	91
Total Industry	49.3	48	51.9	93.6
Index (1947-49=100)	87.4	85.1	92.0	165.0
Net Tons (In thousands)	1,404	1,367	1,478	2,650

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Nov. 29, 1960	Week Ago	Month Ago	Nov. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 29

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.060
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft.)	194.268
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.414
Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED STEEL PRICE INDEX

	Nov. 30 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	208.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.659

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.14
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	28.83	28.83	29.00	42.67	47.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 30 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{9}{32}$" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Nov. 30 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	62.16
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$26.50	$26.50	$26.50	$40.50	$46.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	45.00	48.00
No. 1 Heavy Melt, Chicago	26.00	26.00	26.50	42.50	46.50
No. 1 Heavy Melt, Valley	26.50	26.50	26.50	43.50	52.50
No. 1 Heavy Melt, Cleve.	23.50	23.50	23.50	40.50	49.50
No. 1 Heavy Melt, Buffalo	23.50	23.50	25.50	33.50	43.50
Rails, Rerolling, Chicago	46.50	46.50	46.50	64.50	69.50
No. 1 Cast, Chicago	36.50	36.50	36.50	56.50	49.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

Steel Prices

Mill prices as reported to STEEL, Nov. 30, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 142; footnotes, page 144.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS

Carbon Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ...80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 ....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ...99.50
S.SanFrancisco B3 ...109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 ..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5:50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.5*

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ....6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1 .5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14.7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Harrisburg,Pa. P4 ....6.375
Ind.Harbor,Ind. I-2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (Including loaded extra)
Carbon
LosAngeles P2, S30 ..11.75*
Alloy
Ambridge,Pa. W18 ..10.175
BeaverFall,Pa. M12 ..10.175
Camden,N.J. P13 ....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N. J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

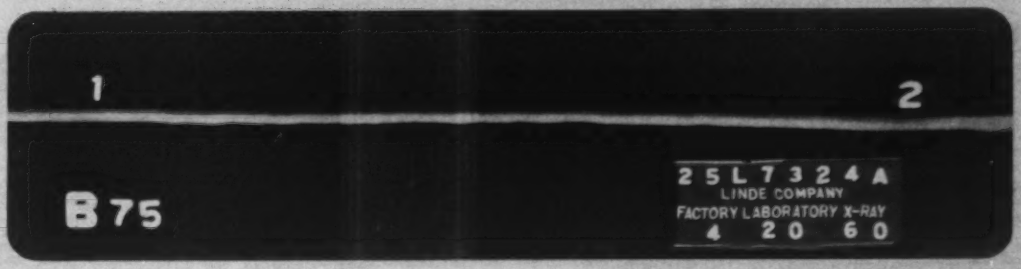
BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca, Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ..8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3..9.025
LosAngelesP2, S30 ....11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20

The Linde Oxygen Converter provides a far greater oxygen supply in 1/7 the space and 237 lbs. less weight than compressed-gas containers.

All the oxygen needed in 1/7 the space



Five-position radiographs on Kodak Industrial X-ray Film, Type AA, check the integrity of the Heliarc girth welds on this oxygen converter manufactured by Linde Company, Division of Union Carbide Corporation.

A high-flying airplane can now carry its oxygen supply in a Linde converter that weighs 237 lbs. less than the usual jumbo-sized cylinder and occupies only 7.9 cu. ft.

In making a container to carry liquid oxygen, Linde Company was faced with the problem of holding extremely high pressures and low temperatures. The problem was solved by using an inner and outer sphere with high vacuum as insulation in between. The seams are Heliarc welded and each proved sound by radiography with Kodak Industrial X-ray Film. With this assurance Linde has extended its 90-day guarantee on the vacuum insulation to a full year.

This is another example of the way radiography helps to further the use of the welding process, and increase the value of welded products.

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X-ray Division **EASTMAN KODAK COMPANY** Rochester 4, N.Y.

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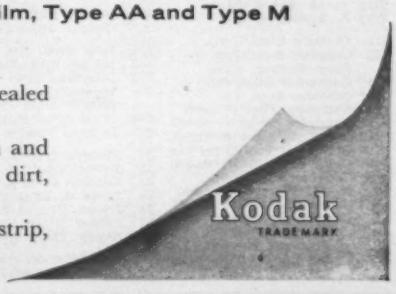
- No darkroom loading—each sheet sealed in a light-tight envelope.
- Just place Ready Pack in position and expose—film protected from dust, dirt, light and moisture.
- In the darkroom—just pull the rip strip, remove film and process.



Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ...6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt) B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.)L5 ...19.80
McK.Rks.(Staybolt)L5, 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 ....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. 11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky.	A10 7.225	7.475
Canton,O. R2	....7.225	....
Fairfield,Ala.	T2 7.225	7.475
Gary,Ind. U5	....7.225	7.475
GraniteCity,Ill.	G4 7.325	....
Ind.Harbor I-2	..7.225	7.475
Irvin,Pa. U5	....7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry.	W10 7.225	7.475
Pitts.,Calif. C11	..7.975	....
Pittsburgh J5	....7.225	....
SparrowsPt. B2	..7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ...7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide MetalsCo.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala. (27) R2 ..5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2,Y1 7.575
Lackawanna,N.Y. B2..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3 8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 .....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	18.85	22.95	27.80
Buffalo W12	...	18.85	....	....
Fostoria,O. S1	...	19.05	22.15	....
FranklinPark,Ill. T6	...	19.20	23.30	28.15
Harrison,N.J. C18	...	18.85	22.95	27.80
NewYork W3	...	18.85	22.95	27.80
Palmer,Mass. W12	...	18.85	....	....
Trenton,N.J. R5	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	18.85	22.95	27.80
Youngstown S41	...	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 .....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 ....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 Common Coke	lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11.	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. †† Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8. 8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ...8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 ....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 ....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 ....13.40
KansasCity,Mo. U3 ...12.90
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
NewHaven,Conn. A7 ..10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ..10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ...16.55
Monessen,Pa. P16 .....16.30
Muncie Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 .....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ....13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 .....13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	.193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	.198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	.198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	.198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville,Ill. K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga. J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	.192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	.192
Johnstown,Pa.(42) B2	.190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	.9.00	9.55**
Aliquippa J5	.8.65	9.325§
Atlanta(48) A11	.9.00	9.75*
Bartonville(48)K4	9.85	19.90
Buffalo W12	.9.00	9.55†
Chicago W13	.9.00	9.55**
Cleveland A7	.9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	.9.00	9.55†
Duluth A7	.9.00	9.55†
Fairfield T2	.9.00	9.55†
Houston(48) S5	.9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	.9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	.9.10	9.65†
LosAngeles B3	.9.95	10.625§
Minnequa C10	.9.25	9.80**
Monessen(48) P7	.8.65	9.35§
Palmer,Mass. W12	.9.30	9.85†
Pitts.,Calif. C11	.9.95	10.50†
Rankin,Pa. A7	.9.00	9.55†
S.Chicago R2	.9.00	9.55**
S.SanFran. C10	.9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	.9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

⅞ in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16) 6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(2) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		22c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Sweepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless	....	....	....	....	37.50
302	26.05	28.80	31.55	34.30	39.75
304	30.50	33.75	36.95	40.15	....
304L	38.20	42.20	46.25	50.25	58.25
316	42.30	46.75	51.20	55.65	....
316L	49.90	55.15	60.40	65.65	....
316 Cb	31.20	34.50	37.75	41.05	47.25
321	36.90	40.80	44.65	48.55	57.00
347	22.25	24.60	26.90	29.25	....
405	20.55	22.70	24.85	27.00	....
410	21.20	23.45	25.65	27.90	....
430	49.80	61.35	72.80	84.40	....
Inconel	43.20	55.05	66.95	78.90	....
Nickel	43.50	55.70	67.95	80.35	....
Nickel, Low Carbon	44.25	55.35	66.45	77.60	....
Monel					

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.35	43.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.965
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.560

Tool steel producers include: A4, A8, B2, B8, C4, C9 C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago, I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.83	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.96	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	9.84	10.05	....	....	10.64	9.82	12.74	....	9.16	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.60	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.15	16.45	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.56	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.20	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅜ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $385.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ⅛ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted.)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Armature grade	9.50
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill Products	(Per base box; 100 lb base wt)
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe, ton, del. east of Mississippi.	36.75
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.60
Bronze powder, 90/10.	55.20
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	58.80
Solder	8.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	24.70
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens	
Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50
Oven Foundry	
Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.25 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.42	....	$5.32	$5.17	$5.52
Bar Size Angles	5.55	....	5.45	5.30	5.65
Structural Angles	5.45	....	5.35	5.20	5.55
I-Beams	5.45	....	5.35	5.20	5.55
Channels	5.45	....	5.35	5.20	5.55
Plates (basic bessemer)	5.70	....	5.60	5.45	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.50	....	24.70	24.70	25.50
Barbed Wire (†)	6.25	....	6.15	6.00	6.35
Merchant Bars	5.55	....	5.45	5.30	5.65
Hot-Rolled Bands	5.85	....	5.75	5.60	5.95
Wire Rods, Thomas Commercial No. 5	6.05	....	5.95	5.95	6.25
Wire Rods, O. H., No. 5	6.25	....	6.15	6.15	6.45
Bright Common Wire Nails (‡)	6.85	....	6.75	6.60	6.95

*Book closed for 1960-61 shipping season. †Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55, Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $350 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5.8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). SM x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb, (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

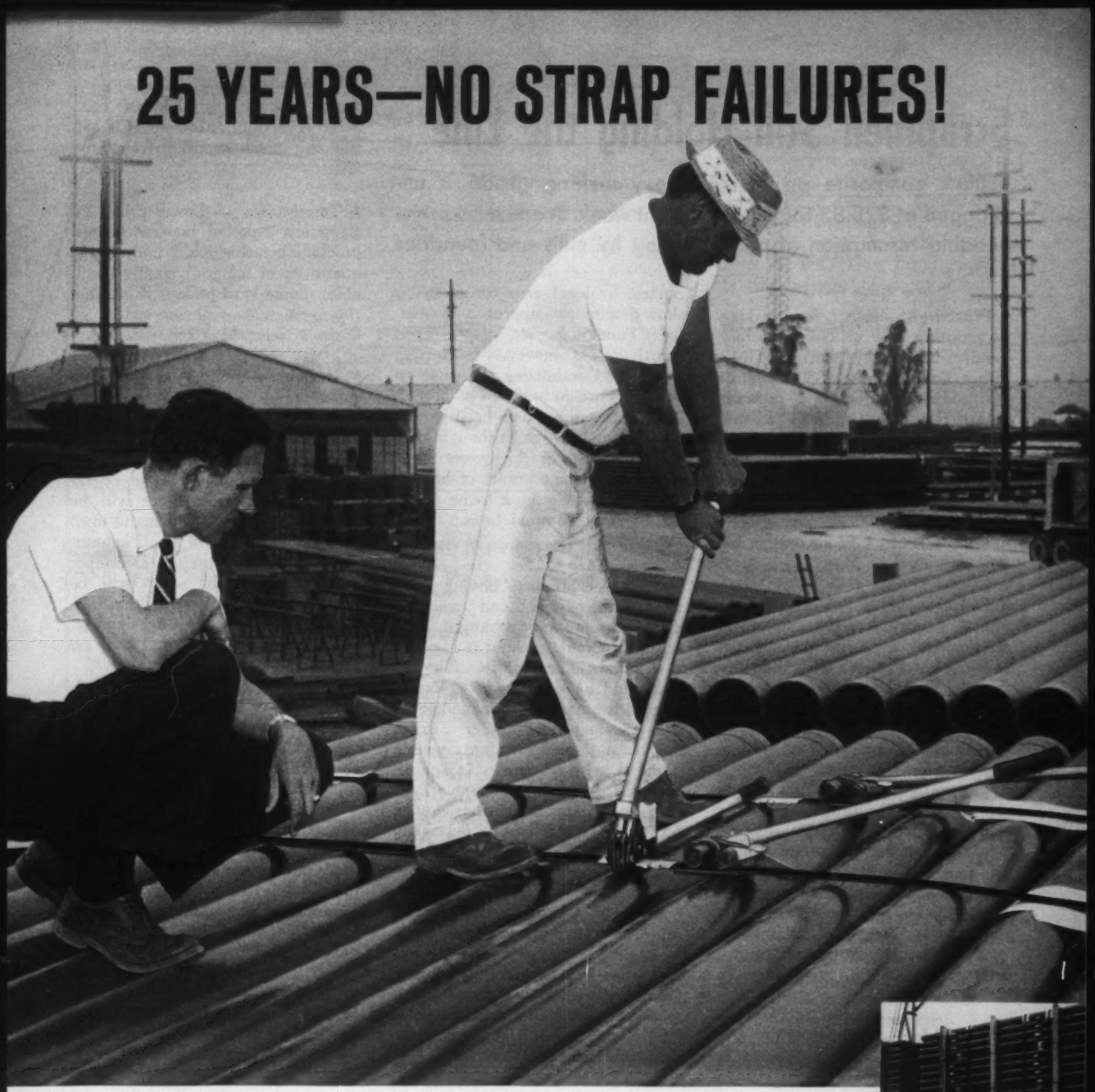
Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

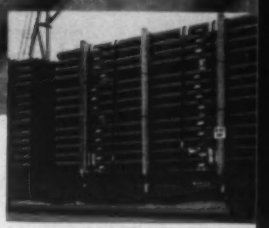
Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

25 YEARS—NO STRAP FAILURES!





Acme Idea Man Paul Koenig keeps Southern Pipe Division of U. S. Industries, Azusa, California, briefed on latest developments in strapping, strapping tools and methods.

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Scrapmen Still Holding the Line

STEEL's composite on No. 1 heavy melting grade is unchanged at $28.83 for fourth straight week. Trade marks time pending resumption of active buying by mills and foundries

Scrap Prices, Page 152

• **Pittsburgh** — Just before making its monthly sale of No. 1 factory bundles, the local plant of GM's Fisher Body Div. sold 500 tons of overproduction from the previous month for about $28.80 a ton. Three days later, brokers bid $28.50 to $29.30 for Fisher's November bundles, up 50 cents a ton from the October average. The market may have hit bottom, but no one here expects much of an upturn before February or March.

• **Chicago**—With the exception of No. 1 factory bundles, prices on steelmaking scrap in this district continue unchanged. It is the third straight week the market has been static. Bids on No. 1 factory bundles that'll be produced by an automobile stamping plant in December averaged a little more than $1 a ton lower than they did a month ago. The drop was smaller than expected. The bundles are now listed at $28-$29, delivered. In addition to the bids, a district mill paid $29 for a small tonnage of the bundles offered by brokers. Prediction of a December steelmaking rate several points below November's is contributing to softness in the market.

• **Philadelphia**—While prices are unchanged on domestic business, buying by local area consumers is slow despite the approach of winter. Foreign buying of the open hearth grades, however, is exerting a generally stabilizing influence on prices. Foreign sales have been a little better than had been anticipated a month ago, although they are smaller than they were some time back. Some grades of borings and turnings continue to be priced on a purely nominal basis.

• **New York** — For the second straight week, brokers' buying prices on the major steel and cast iron grades of scrap are unchanged. Buying for domestic account is at a virtual standstill, except for some activity in the cast grades. Export buying is sustaining the market on the principal steel grades. Prices on borings and turnings remain nominal, with no activity in any direction. In stainless scrap, Type 410 sheets, clips, and solids are off $5 a ton to $40-$45; Type 430 grades are off $5 to $50-$55.

• **Cleveland** — With the holidays approaching, scrapmen don't expect much new buying over the next several weeks, especially with the district steel rate tending downward. Cleveland area ingot operations last week were at 51 per cent of capacity. That's down 3 points from the preceding week, but above the national average of 49.3 per cent. Scrap is plentiful. Industrial is getting the major attention from buyers.

• **Youngstown** — Lower prices for scrap are expected here with steel production sluggish, and large quantities of material readily available. Some local brokers think that the next sales will see prices go down at least $1 a ton.

• **Detroit** — Prices are holding steady, and the market seems to be in a sidewise movement. Dealers and brokers feel it will continue until rising mill activity requires more scrap to sustain ingot operations. They doubt there will be much improvement in demand until spring. There was a small amount of export buying on the December auto lists, but the scrap will be held for shipment until the lake shipping season opens next spring. Water shipments will be closed on the Great Lakes Dec. 15.

• **Buffalo**—With local steel mills continuing to cut production schedules, the outlook for scrap business this month is poor. The mills hold considerable tonnage on track; and they will unload it before making new commitments. The price structure is largely nominal in the absence of new buying. Prices appear to be bumping bottom, though some observers think they could go lower if demand does not improve next month.

• **Cincinnati**—Prices are holding, but a local mill is expected to enter the market for December tonnage, and such action might push prices

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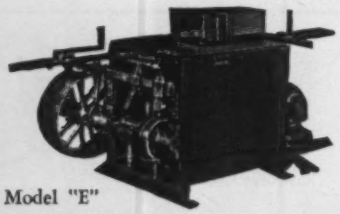

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up a little. There's mounting resistance from dealers at present price levels. Last week, No. 1 busheling went up $1 a ton to $23.50-$24.50 on the strength of a sweetened price by a district mill. The move put the grade above No. 1 heavy melting for the first time in years.

• **St. Louis**—The market continues soft. The outlook for the first quarter isn't promising. One local mill is not buying, and a second is taking in tonnage only at its own prices, which were lowered last month. Foundries are not buying, but some cast iron scrap is moving out of the area to foundries in the South. Stove plate is mainly involved. The only change in prices last week was a drop of $2 a ton on No. 1 cupola.

• **Houston**—The market continues inactive, and prices are unchanged, except for a reduction of $1 a ton on low phos structurals and plates.

• **Seattle**—Scrap demand continues slow, and the market lacks strength. Further price declines are expected by most dealers. Lack of export interest is adding to the general downward tendency. Large buyers are well stocked and are temporarily out of the market.

• **San Francisco**—The steel scrap market here is completing one of the slowest years in history. Prices are unchanged, and there is little likelihood of any changes in the list the rest of the year.

Cargo Movement via Seaway Off Pace Set Last Year

Cargo moved through the St. Lawrence Seaway from April through October was slightly under last year's pace, probably because of sluggishness in the steel industry.

The Seaway Development Corp. reports this year's total of 18,020,137 tons between Montreal and Lake Ontario was 129,675 tons below that in 1959, despite a 19 per cent increase in downbound cargo. Upbound cargo decreased 17 per cent, apparently reflecting a decline in the movement of Labrador iron ore.

In October, downbound cargo totaled 1,691,017 tons, 30.5 per cent more than in 1959; upbound cargo decreased 41 per cent to 1,162,365 tons.

Tonnage on the Welland Canal for April through October totaled 26,047,597 tons, an increase of 10 per cent.

The Seaway closed Nov. 30, but the Welland Canal won't be shut down until Dec. 15.

Pig Iron . . .

Pig Iron Prices, Page 146

Demand for merchant foundry iron is comprised largely of small lots for early shipment. Over-all volume has been fairly steady during the last few weeks. However, the trend is expected to be downward for the remainder of the year, reaching the low point during the final week.

Foundries are only moderately active and are hoping for improved business in the first quarter.

The decline in open hearth operations leaves an unbalanced ratio of pig iron output to steel ingot output in some districts. Unless open hearth activity improves soon, several mills may be forced to cut back on their blast furnace operations to reduce hot metal output.

Rails, Cars . . .

Track Material Prices, Page 144

Freight car orders spurted to 5885 cars in October (vs. 2061 in September), reports the American Railway Car Institute and the Association of American Railroads. Orders in October, 1959, came to 2722 units.

Deliveries in October this year amounted to 4632 cars vs. 4265 in September this year and 2284 in October last year.

Cars on order as of Nov. 1 totaled 15,289 in railroad shops and 7611 in commercial car shops. That compared with 21,662 on order Oct. 1 this year and 36,199 on Nov. 1, 1959.

The Pennsylvania Railroad will build 3500 freight cars at its Altoona and Hollidaysburg, Pa., car shops at a cost of $28,150,000. The order includes 2500, seventy ton hoppercars and 1000, heavy duty gondolas for hauling iron ore. Work on the order is expected to extend from Dec. 1, 1960, through September, 1961. The shops at Hollidaysburg are pushing work on the Pennsylvania's car rehabilitation program, involving major work on 10,500 freight cars. The program is about 60 per cent completed.

Ferroalloys . . .

Ferroalloy Prices, Page 148

Sales of molybdenum have been strong this year, reports Frank Coolbaugh, president, American Metal Climax Inc., New York.

Speaking before the New York Society of Security Analysts, he said: Early this year, his company serviced customers of strikebound, domestic copper firms—they produce the metal as a byproduct. Since then, sales have kept up with capacity production; and foreign markets strengthened when domestic demand weakened.

Mr. Coolbaugh said his com-

(*Please turn to Page* 157)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Nov. 30, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 30	$28.83
Nov. 23	28.83
Oct. Avg.	30.04
Nov. 1959	44.33
Nov. 1955	46.33

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 dealer bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	26.00-27.00
No. 1 factory bundles	*31.00-32.00*
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	*31.00-32.00*
3 ft and under	*30.00-31.00*
Heavy turnings	27.00-28.00
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	*32.00-33.00*

Cast Iron Grades

No. 1 cupola	34.00-35.00
Stove plate	32.00-33.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	34.00-35.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	*30.00-31.00*
Rails, 2 ft and under	46.00-47.00
Rails, 18 in. and under	47.00-48.00
Random rails	42.00-43.00
Angles, splice bars	36.00-37.00
Railroad specialties	37.00-38.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	27.00-28.00
No. 1 hvy melt., dealer	24.00-25.00
No. 2 hvy melting	22.00-23.00
No. 1 factory bundles	*28.00-29.00*
No. 1 dealer bundles	25.00-26.00
No. 2 bundles	16.00-17.00
No. 1 busheling, indus.	27.00-28.00
No. 1 busheling, dealer	24.00-25.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Cut structurals, 3 ft	30.00-31.00
Punchings & plate scrap	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Stove plate	30.00-31.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	41.00-42.00
Drop broken machinery	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
R.R. malleable	40.00-41.00
Rails, 2 ft and under	42.00-43.00
Rails, 18 in. and under	43.00-44.00
Angles, splice bars	37.00-38.00
Axles	48.00-49.00
Rails, rerolling	46.00-47.00

Stainless Steel Scrap

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 bundles & solids	75.00-80.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	17.00-18.00
No. 2 heavy melting	13.00-14.00
No. 1 bundles	19.00-20.00
No. 2 bundles	10.00-11.00
No. 1 busheling	16.00-17.00
Machine shop turnings	*5.00-6.00*
Mixed borings, turnings	*5.00-6.00*
Shovel turnings	*6.00-7.00*

Cast Iron Grades

No. 1 cupola	28.00-29.00
Stove plate	22.00-23.00
Heavy breakable	21.00-22.00
Unstripped motor blocks	17.00-18.00
Charging box cast	23.00-24.00
Clean auto cast	34.00-35.00

CLEVELAND

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	27.00-28.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	28.00-29.00
Cut structurals, plate 2 ft and under	31.00-32.00
Low phos. punchings & plate	26.00-27.00
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	24.00-25.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	28.00-29.00
Brake shoes	35.00-36.00
Clean auto cast	42.00-43.00
Burnt cast	30.00-31.00
Drop broken machinery	42.00-43.00

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Cast steel	32.00-33.00
No. 1 railroad cast	42.00-43.00
Railroad specialties	37.00-38.00
Angles, splice bars	36.00-37.00
Rails, rerolling	51.00-52.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*150.00-155.00*
18-8 turnings	*65.00-70.00*
430 clips, bundles, solids	*65.00-70.00*
430 turnings	*10.00-20.00*

YOUNGSTOWN

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 busheling	26.00-27.00
No. 1 bundles	26.00-27.00
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	27.00-28.00
Electric furnace bundles	27.00-28.00

Railroad Scrap

No. 1 R.R. heavy melt.	26.00-27.00

BUFFALO

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Shovel turnings	13.00-14.00
Machine shop turnings	9.00-10.00
Cast iron borings	11.00-12.00
Low phos. structurals and plates, 2 ft and under	33.00-34.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	36.00-37.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	22.50-23.50
No. 2 heavy melting	19.50-20.50
No. 1 bundles	22.50-23.50
No. 2 bundles	15.00-16.00
No. 1 busheling	*23.50-24.50*
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	10.00-11.00
Cast iron borings	10.00-11.00
Low phos. 18 in.	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	35.00
No. 2 bundles	19.00
No. 1 busheling	35.00
Electric furnace bundles	36.00
Mixed borings, turnings	14.00†
Shovel turnings	18.00
Machine shop turnings	13.00
Heavy turnings	25.00†
Structurals & plates	37.00-39.00
Couplers, springs, wheels	37.00
Rail crops, 2 ft & under	47.00-49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	37.00
Drop broken machinery	47.00-48.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	27.00-28.00
No. 2 bundles	13.00-14.00
Machine shop turnings	4.00-4.50†
Mixed borings, turnings	4.50-5.00†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	145.00-150.00
18-8 borings, turnings	75.00-80.00
410 sheets, clips, solids	*40.00-45.00*
430 sheets, clips, solids	*50.00-55.00*

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	28.00-29.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Cast iron borings	10.00-11.00
Machine shop turnings	15.00-16.00
Shovel turnings	18.00-19.00
Bar crops and plate	36.00-37.00
Structurals & plate	36.00-37.00
Electric furnace bundles	28.00-29.00
Electric furnace:	
3 ft and under	31.00-32.00
2 ft and under	33.00-34.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	45.00-46.00
Unstripped motor blocks	32.00-33.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	38.00-39.00
Angles, splice bars	37.00-38.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	27.00
No. 2 heavy melting	25.00
No. 1 bundles	28.00
No. 2 bundles	18.00
No. 1 busheling	28.00
Machine shop turnings	7.00
Shovel turnings	9.00

Cast Iron Grades

No. 1 cupola	*36.00*
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	39.00
Stove plate	34.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00
Rails, random lengths	34.00
Rails, rerolling	44.00
Rails, 18 in. and under	38.00
Angles, splice bars	32.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	29.00
No. 1 bundles	31.00-32.00
No. 2 bundles	18.00-19.00
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	*34.00*
2 ft and under	*36.00-37.00*

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00

LOS ANGELES

No. 1 heavy melting	*32.00**
No. 2 heavy melting	*29.00**
No. 1 bundles	*28.00†*
No. 2 bundles	*19.00**
Machine shop turnings	*12.00†*
Shovel turnings	*14.00†*
Cast iron borings	*12.00†*
Cut structurals and plate 1 ft and under	41.00†

Cast Iron Grades

No. 1 cupola	*38.00†*

Railroad Scrap

No. 1 R.R. heavy melt.	*40.00†*

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	38.00
No. 2 heavy melting	35.00
No. 2 bundles	19.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	33.00
Heavy breakable	31.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	18.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	35.00
No. 1 (prepared for shears)	33.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	33.50
No. 2 hvy (unprepared)	30.00
No. 2 (prepared for shears)	28.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	33.00
Unstripped motor blocks	30.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	25.80
No. 2 hvy melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

*For export add $4 dock charges.
†Nominal.
‡F.o.b. Hamilton, Ont.

the all-new MILWAUKEE BRIQUETTING PRESS

Chips, turnings and borings are converted rapidly and economically into dense cylindrical briquettes that are classified as high grade scrap.

converts scrap into PROFIT!

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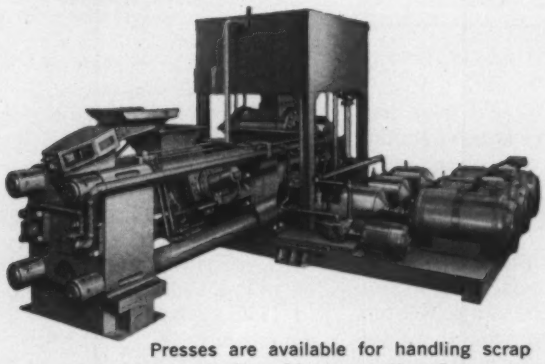

Presses are available for handling scrap volumes from ¾ to more than 9 tons per hour. Milwaukee engineers will evaluate your individual requirements.

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MILWAUKEE *Foundry Equipment Division*

Problem in Silver: Too Much Government

More demand than production could bring price flurries unless government acts soon. Gold miners have their problems, as indicated by lagging U. S. output

Nonferrous Metal Prices, Pages 156 & 157

THE SILVER LINING that's found in every cloud may be pretty expensive soon unless metal output is stepped up.

The reason's a simple one: Production isn't keeping up with consumption.

In no year since World War II has Free World silver output equaled demand. The difference has been met by drawing on government stocks of the U.S., Britain, Cuba, and Russia.

To make matters worse, demand is rising rapidly—particularly in industry.

For example, silver is used in the electrical, electronic, and chemical industries. Even sharper growth is expected.

• **The Problem**—Production won't keep pace so long as prices hold at present levels. Metalmen lay most of the blame for the situation at the door of the U. S. Treasury Department.

Here's why: Treasury has the right to sell silver from its free stocks at a minimum price of 91 cents an ounce (adding freight, it would be delivered in New York from the San Francisco mint for 91.625 cents an ounce). Since the government is exercising this discretionary right, the market price can't be any higher simply because customers would flock to Treasury rather than to the producers.

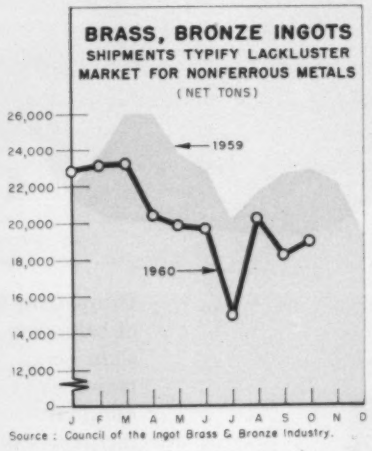
At current prices, it's not economical for many mines to operate. Yet it won't be long until the government exhausts its stocks. Then Treasury will lose all control over the silver market.

In that event, prices could soar, metalmen fear.

Because producers want to guard against a runaway market, they are urging the Treasury to institute a gradual and orderly rise in price. For even if Treasury stands pat, they warn, the silver price will be under pressure by 1962.

Sad Days for Gold

All that glitters isn't profits for miners of gold. As one metalman puts it: "Today a gold mine isn't a gold mine." What he's referring to are the high costs of recovering the metal—the reason U. S. output has dropped from 3 million ounces a year to around 1.8 million ounces. Sources include: Placer operations, 400,000 ounces; underground mining, 800,000 ounces; and copper production (as a byproduct), 600,000 ounces.



• **Needle in Haystack** — To illustrate: Only about 1 ton of gold is recovered from every 7.5 million tons of copper mined. Even in the Union of South Africa (which produces two-thirds of the Free World supply) some 70 million tons of gold bearing ore must be mined to recover 20 million ounces of metal.

In the Markets

• **Aluminum Exports Up**—Foreign demand for U. S. aluminum is at an all-time high this year, thanks to a booming European market. Through September, crude metal exports hit a record 225,350 tons vs. 65,450 tons in the like period of last year. Scrap exports totaled 59,300 tons compared with 19,750 tons in 1959. Exports of semifabricated shapes reached 15,550 tons vs. 10,850 tons last year.

• **Another Copper Strike?**—There's a strong chance workers at Kennecott Copper Corp.'s El Teniente mine in Chile (15,000 tons a month) will walk out when the current contract expires on Dec. 31, believe highly placed observers. Certainly, such a move would have the strong support of the left wing in Chilean politics—it would welcome a strike to bolster its position in upcoming congressional elections.

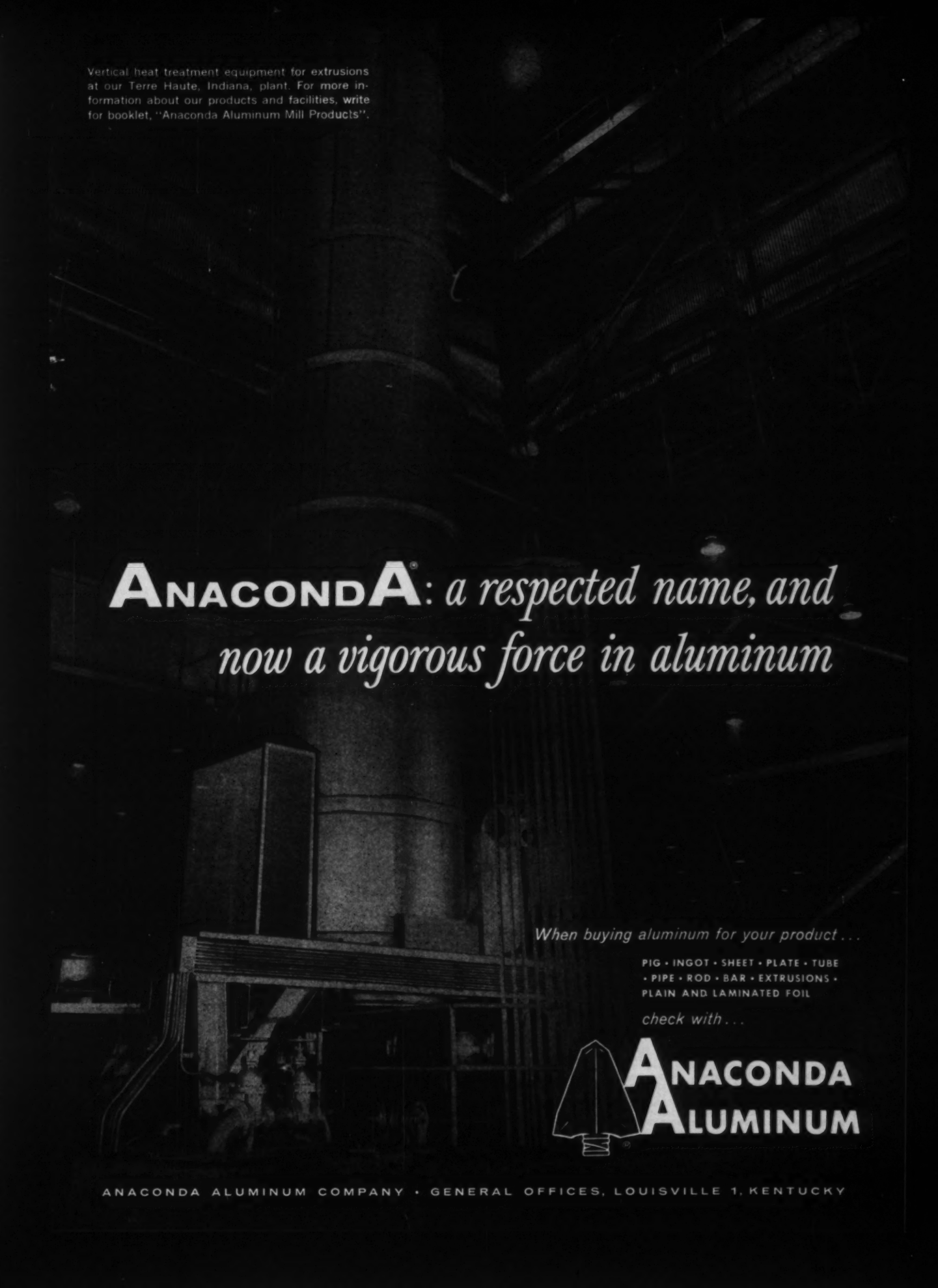
• **Brass Ingots Down**—Shipments of brass and bronze ingots continue to run well under the 1959 level (see chart).

Through October, shipments totaled 201,289 tons compared with 232,744 tons in the same period last year.

• **Aluminum on GATT List**—Domestic primary aluminum producers are unhappy over indications by the U. S. government that it might be willing to lower the present tariff (1.25 cents a pound) on crude aluminum.

Last week, Washington officials issued a supplemental list of materials for which concessions might be granted at forthcoming GATT (General Agreement on Tariffs and Trade) negotiations in Geneva. The list included aluminum, marking a complete reversal of previous gov-

(*Please turn to Page* 157)



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ANACONDA ALUMINUM

ANACONDA ALUMINUM COMPANY • GENERAL OFFICES, LOUISVILLE 1, KENTUCKY

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.ob. Laredo, Tex., in bulk. Foreign brands, 99.5%, 26.25-26.75, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.ob. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-6.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $45-50 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 1950; l.c.l, 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 102.50; prompt, 102.00.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00. East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.75; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.000.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb: nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.ob. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.80; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt: traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range(in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80, 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.25-20.25; No. 1 composition red brass, 18.50-19.00; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Strip, Plate	Rod	Wire	Seamless Tubes
Copper	55.13b	52.36c	....	56.32
Yellow Brass	49.27	34.88d	49.56	53.43
Low Brass, 80%	51.75	51.69	52.04	55.81
Red Brass, 85%	52.62	52.56	52.91	56.68
Com. Bronze, 90%	54.03	53.97	54.32	57.84
Manganese Bronze	57.77-57.82	51.42-51.46	61.69	....
Muntz Metal	52.14	47.45	....	....
Naval Brass	54.06	47.89	60.39	58.24
Silicon Bronze	60.45-60.48	59.64-59.67	59.74-59.77	78.89
Nickel Silver, 10%	64.68	67.01	66.76	....
Phos. Bronze, A-5%	75.70	76.20	75.45	77.63

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

SCRAP ALLOWANCES e

(Based on copper at 30.00c)

Clean Heavy	Rod Ends	Clean Turnings
26.000	26.000	25.250
20.375	19.625	18.625
22.500	22.250	21.750
23.250	23.000	22.500
24.000	23.750	23.250
19.250	19.000	18.375
19.475	19.125	18.625
19.125	18.875	18.375
25.500	25.250	24.500
25.125	24.875	12.562
27.125	26.875	25.875

position turnings, 17.50-18.00; new brass clippings, 16.00-16.50; light brass, 13.00-13.50; heavy yellow brass, 14.00-14.50; new brass rod ends, 15.00-15.50; auto radiators, unsweated, 14.25-14.75; cocks and faucets, 15.75-16.25; brass pipe, 16.50-17.00.

Lead: Soft scrap lead, 7.75-8.00; battery plates, 3.00; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 6.00-6.50; segregated low copper clips, 13.00-13.50; segregated high copper clips, 12.00-12.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 24.25; No. 2 heavy copper and wire, 23.25; light copper, 20.75; refinery brass (60% copper) dry copper content, 21.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.25; No. 2 heavy copper and wire, 23.25; light copper, 20.75; No. 1 composition borings, 20.00-21.00; No. 1 composition solids, 20.50-21.50; heavy yellow brass solids, 15.00-15.50; yellow brass turnings, 14.50-15.00; radiators, 16.00-16.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.04; oval, 43.50 5000-10,000 lb; electrodeposited, 39.00, 2000-5000 lb lots; cast, 41.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.25; 2000-5900 lb, 13.25; 6000-11,900 lb, 13.00; 12,000-22,900 lb, 12.75; 23,000 lb or more, 12.25.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

Stannous Chloride (Anhydrous): 25 lb, 155.60; 100 lb, 150.70; 400 lb, 148.30; 800-19,900 lb, 107.40; 20,000 lb or more, 101.30.

Stannous Sulphate: Less than 50 lb, 140.70; 50 lb, 110.70; 100-1900 lb, 108.70; 2000 lb or more, 106.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 154*)

ernment tariff policy towards the metal. Pressures from independent fabricators for a lower tariff are believed to be behind Washington's change of heart.

• **Zinc Strike Over**—Workers have returned to the job at two zinc smelters and four mines of the New Jersey Zinc Co., ending a walkout that began Aug. 5. What effect resumption of work will have on the zinc market poses a question that won't be answered for several weeks. Certainly, with sales none too strong, and stocks rising, any added production without a corresponding increase in demand would further weaken the market.

Ferroalloys . . .

(*Concluded from Page 151*)

pany's molybdenum sales were running about 30 per cent domestic and 70 per cent foreign, vs. 60 per cent domestic and 40 per cent foreign a year ago. He expects further gains.

Amco is expanding its recently acquired Pyron Corp. (Niagara Falls, N. Y.), producer of iron powders. Capacity will be tripled, enabling the company to supply about 40 per cent of domestic iron powder demand for structural parts.

Copper, which is subject to keen competition from other metals and nonmetallics, should experience larger growth in demand this decade than it did in the last one, he said. Long range prospects for zinc are also attractive, particularly in Europe, and while the trend in growth is not expected to be as steep as in copper, it is enough to provide incentive to keep ahead on plans for production.

Regarding Amco's African properties, Mr. Coolbaugh said: "There is going to be a political transition in Northern Rhodesia, and we are not pretending to guarantee the outcome; but we believe there is a good chance industrial disturbances can be avoided, and that the companies can continue to operate successfully under any form of government that may emerge."

Tubular Goods . . .

Tubular Goods Prices, Page 145

Drilling activity normally picks up in November and December, and it looks like this year will be no exception. Latest reports show an upswing in the number of rotary rigs in operation. In the latest week of record, 2005 rigs were operating in the U. S. and Canada—1858 were in the U. S., an increase of 46 for the week, and the highest number active since May, 1959, when the total was 1895.

The increased activity should be reflected in greater demand for tubing, casing, and drill pipe, but it may be several weeks before the mills begin receiving orders.

Tubemakers think the major oil companies have nearly completed their inventory adjustments, but they're not betting on it yet. However, users don't expect a price increase and haven't been laying in any pipe as a hedge against one.

In standard pipe, the situation is brighter. Jobbers and consumers completed their inventory adjustments during the summer and have since been buying at a rate equivalent to use. With the passage of the peak season for construction, pipe shipments are expected to decline this month and remain at a relatively low level until spring.

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tering slightly heavier orders for first quarter in New England. They will close the year with low stocks.

Canadian Steelmen Don't Expect Price Hike Now

Despite rumblings about price increases in the U. S. and Canadian steel trades, Canadian steelmen and service center operators think such a move is unlikely.

"Demand doesn't meet production," says a leading Canadian purchasing executive. He admits that mills are being squeezed by costs; they would put through an increase if the market could stand it.

In Canada, steel plants are running close to 90 per cent of capacity. However, imports are competing sharply for sales. Import prices are often lower than Canadian mill prices.

"Although Canadian steel mills are working at a higher rate than U. S. mills, it's at a slackening rate," points out Ernest Samuel, general manager, Samuel, Son & Co., a steel warehousing firm.

Canadian steel prices have held unchanged 2½ years, except for minor revisions within product lines.

Canadian Steel Production Shows Good Gain This Year

While there was a tapering off in Canadian iron and steel production in midsummer, a pickup developed in October, and figures for the first ten months of the year show a gain over the corresponding 1959 period.

Production of steel ingots in the week ended Nov. 19 was 106,382 tons, 82.5 per cent of capacity vs. 112,214 tons, 87 per cent, the week earlier, and 125,166 tons, 95.5 per cent, in the like week of 1959.

For the ten months ended Oct. 31, production of ingots totaled 4,900,603 tons, up 156,838 tons from the 4,743,765 tons produced in the corresponding period of last month.

Pig iron output in October amounted to 368,952 tons, vs. 341,786 tons in September and 360,812 tons in October, 1959.

For the first ten months of 1960, pig iron output was 3,651,283 tons, a gain of 193,644 over the 3,457,639 in the same 1959 period.

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See Page 6 Servicenter For Details

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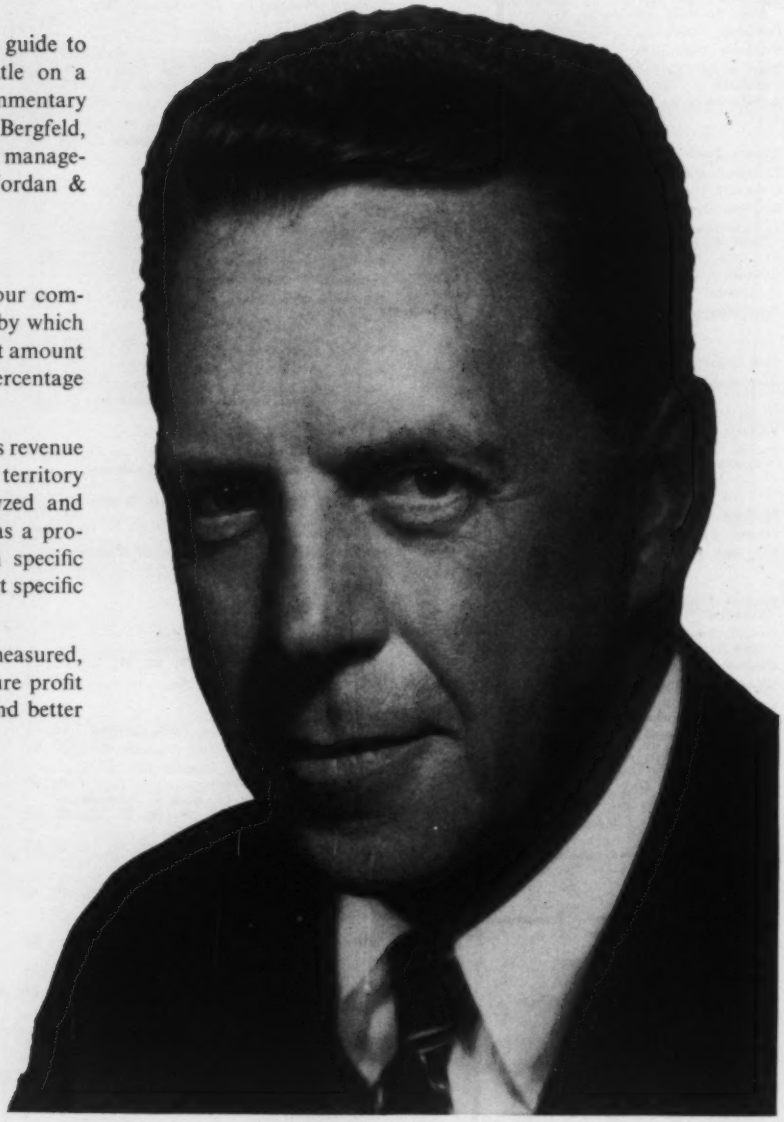
"Programming advertising costs as a measured, reasoned and integrated part of a future profit plan usually results in a better plan and better actual future profits."



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